ANNALS

OF THE

ROYAL BOTANIC GARDEN, CALCUTTA.

Vol. I.

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1888
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ANNALS

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ROYAL BOTANIC GARDEN, CALCUTTA.

Vol. I.

THE SPECIES OF FICUS

OF THE

INDO-MALAYAN AND CHINESE COUNTRIES

BY

GEORGE KING, M.B., LL.D., F.R.S., F.L.S.,

Superintendent of the Garden.

CALCUTTA:
Printed at the Bengal Secretariat Press.
LONDON:
L. Reeve & Co., 5, Henrietta Street, Covent Garden.
1888.

MISSOURI BOTANICAL
GARDEN LIBRARY

DEDICATED

TO

Sir Joseph Dalton Hooker,

K.C.S.I., C.B., F.R.S., D.C.L. OXON., LL.D. CANTAB., DUBLIN., EDIN., AND GLOTT.,
CORRESPONDING MEMBER OF THE INSTITUTE OF FRANCE,
ETC., ETC., ETC.,

AS A HUMBLE TOKEN OF ADMIRATION AND RESPECT.

THE
SPECIES OF FICUS
OF THE
INDO-MALAYAN AND CHINESE COUNTRIES.

PART I.
PALÆOMORPHE AND UROSTIGMA.

MISSOURI
BOTANICAL
GARDEN.

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PART II.
SYNŒCIA, SYCIDIUM, COVELLIA, EUSYCE AND NEOMORPHE.

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ERRORS AND OMISSIONS.

PAGE 14. In the definition of sub-series 4, after the word *coriaceous*, insert the words (*sub-coriaceous in No.* 38.)

„ 22. To the description of *F. cucurbitina*, King, add the following account of the flowers:—Male flowers very numerous, scattered all over the interior of the receptacle, sessile or pedicellate, the perianth of three short imbricate pieces, anther broadly ovate on a short, thick filament; gall flowers sessile, the perianth of three dark-coloured cartilaginous pieces; ovary ovoid, smooth, with a thin sub-terminal style; fertile female flowers like the galls, but the ovary larger and more globose when ripe.

„ 28. To the description of *F. juglandiformis*, King, add the following account of the flowers:—Male flowers numerous and scattered over the whole interior of the receptacle, usually on long, thick pedicels, the perianth of two oval, hyaline, very concave pieces, which closely envelope the young anther; anther elliptic, narrow, on a short, thick filament; gall flowers ovoid, sessile, smooth, with a short, thin, curved, sub-terminal style, the perianth of three linear-lanceolate pieces; fertile female flowers like the galls, but longer, the ovary narrower, the style straighter and terminated by a clavate stigma.

„ 32. Seventh line from the top of the page.—Delete the letter F after the number 4559 of Wall. Cat.

„ 37. Tenth line from top of page.—For the word *membranous*, substitute the words *thinly coriaceous*.

„ 43. In the synonymy of *F. Benjamina*, alter *Urostig. Benjamina* to *U. Benjamineum;* and after the words *Urostig. nudum*, insert the words *and hæmatocarpum.*

„ 59. Fourth line from top of page.—For *accidens* read *accedens.*

„ 63. Fourth line from top of page.—For *Wall. Cat.* 4585*B*, read *Wall. Cat.* 4485*D*.

„ 63. In the synonymy of var. 3. Wightiana, after *Miq. in Ann. Mus. Lugd. Bat. iii.* 286 add the words *Benth. Fl. Hong-Kong* 327, and in the concluding paragraph of the remarks under var. *caulocarpa*, delete the whole of the sentence beginning "*But the name is already occupied*, &c., &c.

„ 86. Under *F. radicans*, Roxb. add reference to Kurz Flora B. Burmah ii, 452, including the var. *abnormis.*

„ 90. To the synonyms of *F. ampelos*, Burm. add *F. politoria*, Lamk. Dict. II, 500; Miq. Fl. Ind. Bat. I, pt. 2, p. 298.

„ 116. Last line of page. For *F. dæmonum* read *F. dæmona.*

„ 139. In second but last line of the synonymy of *F. diversifolia*, Bl., for *Erythrogyne frutescens* read *E. lutescens.*

„ 144. In the fourth line of the synonymy of *F. pumila*, Linn. after the word Ficus add "7 and."

„ 173. Delete the words (non Roxb.) after the words *F. racemosa*, Wall.

THE
SPECIES OF FICUS
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INTRODUCTION.

THE genus *Ficus* was founded by Linnæus, and in the first edition of his *Species Plantarum* he described seven species, four of which are Indian. By the time Sprengel's edition of Linnæus' *Systema* appeared (1825 to 1828) the number of species had risen to 118, of which 50 were from the Indo-Malayan region. In 1825 Blume's *Bijdragen* was published, and in it there are descriptions of 93 species of Malayan figs, of which 82 were described for the first time. Roxburgh's *Flora Indica*, although completed before the author's death in 1815, was not published until 1832, and in it 55 Indian species are described. Of these species, 41 bore Roxburgh's name as their author; but only about 15 of them had previously been undescribed. Although Gærtner had given a fairly good description of the achenes of *F. carica* and of *F. religiosa*, yet, between the time of Linnæus and that of Roxburgh, systematic writers had paid but little attention to the structure of the flowers and to the mode of their arrangement on the receptacles, the species being founded purely on external characters. The remarks of Linnæus himself on the common eatable Fig in the *Hortus Cliffortianus* (published five years before the first edition of his *Genera Plantarum*) show that he had a clearer apprehension of the actual arrangements of the sexes than most of the writers who succeeded him. In the *Hortus Cliffortianus* Linnæus reduces to the same species the Fig, the Caprifig, and erinosyce; regarding the Caprifig as the male, the Fig as the female, and erinosyce as the hermaphrodite form of one and the same species. In the first edition of the *Species Plantarum* Linnæus put the genus *Ficus* into his class *Cryptogamia*, but in the second edition he transferred it to *Polygamia Polyœcia*, thus confirming the view as to the nature of the arrangements of the flowers of the common Fig which he had expressed in the *Hortus Cliffortianus*. In his *Enumeration* (1806) Vahl put *Ficus* into *Triandria Monogynia*, thus showing that he not only completely misunderstood the sexual arrangements, but that he could never have even counted the stamens. In Sprengel's edition of Linnæus just quoted, *Ficus* is put into a section of *Monoecia* called *Androgynia*, from the supposition that flowers of each sex are found in each receptacle. The character of the genus given by Blume in his *Bijdragen* shows that he must have adopted Vahl's definition without examination of the flowers; for, according to Blume, as to Vahl, the male flowers of the genus are triandrous. Blume mentions that the males have a rudimentary pistil, which, as a matter of fact, is the case in only a small number of species. Roxburgh is the first writer who attempts to describe the flowers of each species, and in a note attached to his definition of the genus in his *Flora Indica* he says:—"I have examined minutely the florets of nearly the whole of the species, and found only two instances in which they were not androgynous, and by far the greater part are monandrous." He therefore puts *Ficus* into *Monoecia Monandria*. Gasparrini and Miquel were the next botanists who appear to have made a careful study of the flowers of the genus. In the year 1844 Gasparrini published a remarkable paper, in which he divided all the species of *Ficus* known to him into eight genera, viz. *Ficus* proper, *Caprificus*, *Tenorea* (a name subsequently changed by himself to *Macrophthalma*), *Urostigma*, *Visiania*, *Cystogyne*, *Galoglychia*, and *Covellia*. His first genus, *Ficus* proper, contained only one species, namely the common eatable Fig of Southern Europe. His second genus, *Caprificus*, contained only the Caprifig, which, as Linnæus had maintained nearly a hundred years before, and as the most recent observations have demonstrated, is only the male of the plant of which the eatable Fig is the female. Gasparrini's genus *Tenorea* contained only a single species, the *F. pumila* of Linnæus. His fourth genus, *Urostigma*, is the only one of his groups which has stood the test of experience. It contained all the species known to Gasparrini of the section as defined in the following pages. Into his fifth genus, called *Visiania*, Gasparrini put only a single plant, viz. *F. elastica*, a species referred by all subsequent writers to *Urostigma*. The sixth genus contained a single species, *F. leucosticta*, a species which I have referred to *Covellia*. *Galoglychia*, Gasparrini's seventh genus, consisted of two species, which, being American, lie beyond the scope of the present undertaking. To Gasparrini's eighth genus, *Covellia*, he referred only a single species, of which he says he had neither seen male flowers nor ripe seeds.

During the same year (1844) in which Gasparrini's new classification was published, Miquel, in *Ann. des Sciences Naturelles*, series III, I, p. 31, working chiefly on some of Roxburgh's descriptions, suggested that the species described in the *Flora Indica* of that author ought not to be considered as forming a natural homogeneous group, but as divisible into very distinct sections; and in the same paper he proceeds to distribute twenty-five of them into the two sections *Cariça* and *Sycocarpus*, while on one of Roxburgh's species (*F. oppositifolia*) he founds the new genus *Sycomorphe*. The basis of Miquel's (as of Gasparrini's) classification, was the structure and disposition of the flowers. Three years later (*i.e.* in 1847) Miquel began to publish, in Hooker's *London Journal of Botany*, a monograph of all the species of the old genus *Ficus*, and as the result of his extended study of it he established the following genera:—*Urostigma*, including 167 species; *Phar-*

macosycea, including 12 species; *Pogonotrophe*, including 16 species; *Sycomorus*, including 12 species; *Ficus*, including 138 species; *Covellia*, including 31 species; *Synœcia*, including 2 species. These seven genera were formed solely on characters obtained from the structure and disposition of the flowers, the number of the stamens and the character of the stigma forming prominent features in the diagnoses. Some of the characters were founded on undoubted errors of observation, as, for example, when the female flowers of *Covellia* and those of both males and females in *Synœcia* are described as without perigonium. This arrangement was subsequently abandoned by its author, and Miquel himself, twenty years later (in 1867), published, in the *Ann. Mus. Lugd. Bat.*, vol. III, a rearrangement of *Ficus*. In this new arrangement Miquel abandoned the idea of breaking up the genus *Ficus* into genera, and substituted for that scheme one in which the reunited genus is subdivided into six sub-genera, as follows:—*Urostigma*, with 143 Old World, 110 American species, and 21 of doubtful nativity; *Pharmacosyce*, with 18 species, all American; *Erythrogyne*, with 2 species; *Synœcia*, with 3 species; *Eusyce*, with 209 species; *Covellia*, with 48 species. In this rearrangement three of Miquel's old genera—*Urostigma*, *Pharmacosyce*, and *Covellia*—appear, with enlarged and slightly altered characters, as sub-genera. The name of a fourth old genus, *Synœcia*, is kept up for a sub-genus; but the name only, for a totally different set of characters are given to the sub-genus from those which characterised the genus. And two entirely new sub-genera, viz. *Erythrogyne* and *Eusyce*, are established. The total number of species included in this second enumeration of Miquel's is 405 Old World species, 128 American species, and 22 species of doubtful nativity. In this second arrangement of Miquel's the flowers alone are not trusted to entirely for the sub-generic characters, but account is also taken of the form and situation of the receptacles, of the form of the leaves, and of general habit.

In the *Genera Plantarum* of the late Mr. Bentham and Sir J. D. Hooker four of Miquel's sub-genera, viz. *Urostigma*, *Eusyce*, *Synœcia*, and *Covellia*, are admitted. *Pharmacosyce* (a diandrous group of *Urostigma*-like species) is accepted with doubt, and the sixth, *Erythrogyne*, is suppressed. But these eminent botanists admit that the sections which they adopt from Miquel are too loosely defined, and they commend the whole genus to the attention of the monographer. This advice, together with the kind personal encouragement of Sir Joseph Hooker, induced me to carry through to completion an attempt which I had begun a year or two previously to elucidate the structure and affinities of the species of *Ficus* found in the Indo-Malayan region.

The flowers of the genus *Ficus* are collected in a cymose manner on a fleshy axis, which, by the curving upwards of its circumferential part (or organic base), is converted into a kind of flask, on the inner surface of the walls of which a number of flowers are arranged. As the bottom of the interior of the flask corresponds to the apex of the axis, the flowers developed there are the oldest, while those developed nearest the mouth—the organic base—are the youngest. These flower-bearing axes are called figs, receptacles or amphantha. They vary in colour, form, size, and in the situation which they occupy on the plant. In some species of the section *Urostigma* the receptacles while young are enclosed in calyptriform involucres, which are thrown off at an early stage of the expansion of the receptacles. These hoodlike bodies persist longer in *F. altissima* than in any other species, but on the whole they are too fugacious to found specific characters upon. The hollow receptacle has walls of more or less fleshy texture, and its mouth is occupied by rows of bracts, which in the majority of cases so interlock as practically to close it. The lower of these bracts often bend downwards into the cavity of the receptacle, curving round the upper flowers; the middle bracts are more or less horizontal in direction; while those towards the upper or outer part of the mouth project therefrom, so as to be visible externally and to form a more or less prominent apical umbilicus. In a few species the mouth is surrounded externally by a more or less clearly defined annulus, formed of coalesced bracts. In shape the receptacle varies from spheroidal to ovoid, ellipsoid, obovoid, or pyriform. In most species involucral bracts are found at the base of it. These bracts (which are alluded to in the following pages as the *basal bracts*) are usually three in number. They are generally distinct from each other, but sometimes they are slightly united, so as to form a kind of involucral cup. The receptacle in many species is contracted towards its base, and in some this contraction is carried to such an extent that a kind of false stalk is formed. This stalk-like contraction must not however be confounded with the peduncle proper, by which, in many species, the receptacle is attached to the axis; and as a fact the stalk may invariably be distinguished from the peduncle proper by the position of the involucres just referred to, which are attached at the apex of the peduncle proper, but at the base of the pseudo-stalk. As regards situation, receptacles may occur in pairs in the axils of the leaves (e.g. *Urostigma*), or they may be solitary in the same situation from the abortion of one of the original pair (e.g. *Synœcia*). They may also occur in axillary fascicles of three or more. In a large number of species (e.g. *Neomorphe*) the receptacles are borne on tubercles (*i.e.* shortened leafless branchlets) from the larger branches or from the stem; while in one set of species (*Covellia*) the receptacles are borne on long, sub-aphyllous branches, which, proceeding from the stem near its base, either trail along the surface of the ground or bury themselves in the soil. In one very remarkable species (*F. Minahassae*) the receptacles are collected in dense capitula, which in turn are arranged in long leafless branches which droop towards, but hardly reach, the ground. In a few species (e.g. *F. hispida*) receptacles occur both in the axils of the leaves and on stem tubercles. In size, as in colour, the receptacle varies much, and excellent specific characters are derived from these differences.

The flowers, which are mostly unisexual, are situated on the inner walls of the receptacle. They may be either sessile or pedicillate. In some species they are separated from each other by scales or bracteoles, and in others by hairs, both of which appendages appear to be analogous to the *paleæ* that are found on the receptacles of many *Compositæ*. In other species the flowers lie close together, unseparated by any intervening appendages. Five kinds of flowers are found in the genus, viz. male, pseudo-hermaphrodite, neuter, fertile female, and gall flowers. The structure of each of these is very simple. The male flowers consist of a perianth of from three to five pieces, which, although sometimes united, are usually free. The perianth sometimes hardly covers the stamen or stamens; in other cases it is large, inflated, and completely envelopes the stamen. In some species the pieces of the perianth are thin and colourless, and not unfrequently hyaline; in others they are of a red or dark-brown colour and opaque. In quite half the Indo-Malayan species there is only a single stamen; in very many there are only two; while in only a few are there so many as three. In shape the anthers are for the most part ovate or elliptic, although some are very broad and almost rotund; they are always 2-celled and have sutural dehiscence. Some are sessile or nearly so, and in very few is the filament long. The attachment of the anther to the filament is innate in most species; in a few, however, it is adnate. In species with two stamens the filaments are often united for the whole or part of their length, leaving the anthers however free.

Pseudo-hermaphrodite flowers occur in only a few species. Such flowers have a perianth like the ordinary male flower, but along with the single stamen there is present in them a pistil with completely formed style and ovary. I have, however, never found one of these ovaries to contain a seed, but I have not unfrequently found one containing a pupa.

Neuter flowers are found only in the few species forming the section *Synœcia*. They are long-pedicillate and have a 3-leaved perianth, without any trace of either anther or pistil.

Fertile female flowers have a perianth not very different from that of the males, but consisting in many cases of more pieces, and being more often gamophyllous. In the case where the pieces of the perianth are free, the individual pieces are sometimes rather easily detached, and are very apt to be confounded with the bracteoles of the receptacles in species where the latter exist. The perianth is usually much smaller than the mature achene, and covers the latter very incompletely or not at all. In some cases where the perianth is gamophyllous it forms a small cup, which surrounds only the base of the ovary or its pedicel. It was in some such cases, where the perianth is hyaline, that Miquel was led to believe that none existed; and hence his statement about the perianth being absent in *Covellia*. The pistil may be sessile, but it is very often pedicillate; the ovary is more or less ovoid or obovoid, with a tendency to be emarginate on the side at which the style is attached. It contains a single pendulous ovule. The style is filiform, and is in most cases distinctly lateral or sub-terminal: it rarely springs from the apex of the ovary. In length the style usually greatly exceeds the ovary: it is usually smooth, but in a few species it is hairy. The stigma, which is papillose, varies in shape, being cylindric, clavate, capitate, peltate, or infundibuliform; and in a few cases it is flat. In many species it is obliquely truncate, and in not a few bicrural. It is, however, often very difficult to determine the exact form of the stigma, from the fact that at an early stage the stigmas of all the fertile female flowers of the same receptacle are joined together in a dense felted mass, from which it is nearly impossible to detach any individual in a state of entirety. After fertilisation the ovary becomes developed into an achene, which tends to be unilaterally emarginate (many achenes are very distinctly reniform), and the style becomes more lateral, or even basal. The ripe achene has a crustaceous pericarp of a pale yellow colour and with a more or less minutely tuberculate or undulate surface. External to the crustaceous coat there is occasionally a glairy or viscid layer. The pericarp is never very thick, and sometimes it is conspicuously thin. On cutting the achene open, the embryo is seen with a small amount of albumen. I have not, however, paid much attention to the relation of the albumen to the embryo. Not a few of the perfect female flowers fail to be fertilised. But the fact of the barrenness of such is not recognisable until the achene has been cut open and they are found to contain no embryo. Externally these infertile achenes exactly resemble those containing embryos.

Besides the above four kinds of flowers, there occur in all the species of *Ficus* which I have examined a set of flowers which, adopting the name given to them by Count Solms-Laubach, I call *gall* flowers. My own name for these was originally *insect-attacked females*; but Count Solms-Laubach's name being much shorter and more suitable, I have adopted it. The existence of these gall flowers in this genus as a separate and distinct kind of flower, was first made publicly known by the distinguished botanist just mentioned in *Botanische Zeitung*, Nos. 33 to 36 for 1885. My own observations and inquiries on *Ficus* have been in progress since 1878, but on account of my unwillingness to publish anything until I had completed my research, I have been anticipated in the publication of the facts about gall flowers. The gall flowers in many respects resemble the fertile female flowers: they have in most cases a similar perianth, an ovary, and a style. When fully developed, they are recognised at a glance by their containing the pupa of an insect, which can often be seen through the pericarp of the false achene into which the ovary develops. But whether the pupa be visible or not, or whether it be present or not, the false achene of the gall flower may in its later stages be distinguished from the true achene of the fertilised ovary of the perfect or fertile female flower by being more often pedicillate, and by its shape being usually globular and rarely elliptic or reniform; by its surface being smooth, not minutely tubercular or undulate and never viscid or glairy; and frequently also by the tense, distended appearance of its tough membranous wall (false pericarp). The style is, as a rule, much shorter and straighter than the style of the fertile female flower, and more terminal, and it has very frequently a dilated tubular apex which occupies the situation of the true stigma, but has often little or none of the viscid parenchyma characteristic of that organ. These peculiarities in the nature of the stigma and the shortness of the style are apparent in the gall flowers of many species from a very early stage. They are not consequences of the deposit of the egg of an insect in the ovary, but, as Count Solms-Laubach points out (*Bot. Zeitung*, l.c.), such original peculiarities in the style and stigma of the gall flower may rather determine the selection of it by the insect as the nidus for its egg. There are, however, many species of *Ficus* (more especially in the group *Urostigma*) in which the gall and fertile female flowers are not characterised by any marked differences in the form of style and stigma, and it is only by cutting the ovaries open that the two can be distinguished.

Now there is probably nothing in itself very remarkable in the mere occurrence in the genus of numerous flowers having the general form of females, which yet, by reason of certain peculiarities in their structure, are incapable of fertilisation by pollen and are practically barren, while at the same time their very structural defects fit them for becoming the nidus for the eggs of special insects. But when the manner in which these malformed female flowers are disposed in the receptacles is inquired into, it becomes clear that, through the interposition of insects, these malformed females may play a most important part in the life-history of many species of the genus. In all the species, except those included in the section *Urostigma*, the gall flowers occupy the same receptacles as the males, while the fertile female flowers occupy different receptacles. In other words, the majority of the species have two distinct sets of receptacles—one set containing male and gall flowers, but no fertile female flowers; and another set containing only fertile female flowers without any trace of either male or gall flowers. The proportion of males to gall flowers in receptacles of the former kind varies. In all (excepting the *Urostigmas* just mentioned) it is the rule to find the males confined to a zone of greater or less width at the apex of the receptacle just under the scales which close its mouth. Sometimes this zone is very narrow indeed, and consists of only a single row of male flowers, and that row not always a complete one; the remaining part of the interior of the receptacle being occupied by gall flowers. In by far the majority of cases these two kinds of receptacles, so physiologically distinct, are undistinguishable by external characters, and they are both borne by the same individual plant. They look exactly alike until one cuts them open and examines their contents. The most notorious of the few exceptions to this rule is the common eatable fig (*Ficus Carica*), in which species the male and gall flowers occupy elongated receptacles borne in one set of individual trees, while the fertile female flowers occupy more or less globular receptacles which are borne by a different set of trees. So different in appearance are the two kinds of receptacles in *F. Carica*, that the trees bearing them (although they have similar leaves) have almost from time immemorial been considered distinct species, known by distinct names—the former being called the Caprifig, the latter the Fig. A vague idea of sexual relationship had indeed prevailed even from the time of Aristotle, and on this idea was founded the practice of caprification. Linnæus indeed, in his *Hortus Cliffortianus*, boldly declared that the Caprifig and Fig were merely male and female of the same species. Linnæus knew that the Caprifig was practically a male, for he says the male Fig (Caprifig) is formed of male florets and of female florets, and of those the females are sterile: the female (Fig) is composed of female florets only. But botanists subsequent to Linnæus regarded the Caprifig and Fig as distinct species. This was Miquel's view, even in his latest rearrangement of the genus; and Gasparrini, as we have seen, formed *Caprificus* and *Ficus* each into a monospecific genus. Another favourite opinion has also been that the two forms are races of one plant, the Caprifig being the wild race and the Fig the race which has been produced by cultivation. This was the view which Count Solms-Laubach maintained and defended with much skill in a paper published so lately as 1882.* The chief support of this view is really the fact that amongst the gall flowers of the Caprifig there are occasionally developed perfect female flowers which become fertilised and yield seed. Thus Gasparrini states that, by carefully examining the contents of forty receptacles of Caprifig, he succeeded in obtaining from them twenty perfect embryo-containing achenes. The view which Count Solms-Laubach at first adhered to was combated by Fritz Muller, who maintained the opinion of Linnæus that the two are but the male and female plants of one and the same species. So impressed was Solms-Laubach by Muller's arguments, that he undertook a journey to Java in order to be able to examine the fresh receptacles of other species with the view of discovering what the disposition of the flowers in these might be. The results he found to be confirmatory of Muller's theory and contradictory of his own, and, with a magnanimous candour which is unfortunately too uncommon, he publicly abjured his own theory and adopted that of his critic. It was during this investigation that Count Solms-Laubach discovered the true nature of the gall flowers.

F. Carica is not an Indo-Malayan species, but I have referred to it at such length not only on account of the interest that attends the final settlement of a long-pending controversy, but because this species illustrates in an extreme form the arrangements which obtain in a large proportion of the species of the genus. Count Solms-Laubach went to Java expecting that the dimorphism in the receptacles respectively containing the male and female flowers which obtains in *Ficus Carica* would be found to be characteristic of other species, and, all through his interesting and remarkable paper in *Botanische Zeitung* to which I have already referred, the influence of this expectation is traceable. As a matter of fact, however, dimorphism in the male and female receptacles is the exception, and in hardly any other case is it so strongly marked as in *F. Carica*.

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* *Die Herkunft, Domestication und Verbreitung des gewohnlichen Feigenbaums* (Ficus Carica, L.). Von Grafen zu Solms-Laubach.—Aus dem achtundzwanzigsten Bande der Abhandlungen der Königlichen Gessellschaft der Wissenschaften zu Göttingen, 1882.

In the majority of the gall flowers an insect deposits an egg, and many of them contain a pupa, which is easily seen through the coats of the false achene. The imago escapes into the cavity of the receptacle by cutting its way through those coats, and the fully developed winged insects are often to be found in considerable numbers in the cavity of the fig, the opening by which each escaped from the ovary in which it was developed being clearly visible. In many species the perfect insects escape from the cavity of the receptacle into the open air by a passage perforated by the males through the scales that close the mouth of the latter. The egg of the insect must in many cases be deposited in the ovary of the gall flower at a very early period; for about the time at which the pupa is escaping from the ovary, the pollen of the anthers of the male flowers is only beginning to be shed. It is evident therefore that the synchronism of the two events—the escape of the insect and the maturity of the pollen—is an arrangement of much physiological significance. In the species of *Ficus* in which the arrangement just described obtains (and these are by far the majority), the perfect female flowers are contained in receptacles which are consecrated to themselves alone. In these receptacles the flowers are all perfect females. There is not a trace of a male or of a gall flower. These receptacles, in many species, are perfectly closed from a very early stage, and yet in the majority of cases every one of the ovaries of the females they enclose contains, when mature, a perfect embryo. The exact way in which these females are pollenised is a matter on which I cannot pretend to throw any light. I can only state the problem. The males are shut up from an early age with a number of females, the structure of whose organs is unfavourable to pollenisation. No pollen is produced by the males that are shut up with these females until all possibility of their becoming fertile with pollen has been precluded by the deposit within each of their ovarial cavities of the egg of an insect. On the other hand, a number of perfectly formed females, *all well adapted for the reception of pollen*, are shut up together in a receptacle which contains neither male nor gall flowers, and to which it is from a very early stage apparently impossible for insects bearing pollen to get access. Yet each of the females situated in such apparently disadvantageous circumstances bears a well-formed embryo. No doubt the insect developed in the gall flowers in some way conveys the pollen of the males to the perfect females imprisoned in the neighbouring receptacles. But although one can understand that it is to the advantage of the insect to enter the receptacle containing the gall flowers, since these afford it such a suitable nidus for its egg, and that the mature insect in escaping from these receptacles may inadvertently carry along with it some of the pollen which the anthers are then shedding, yet it is difficult to understand how the pollen so removed is conveyed into the interior of the receptacle containing the perfect females, and how these females are so universally fertilised by it.

This arrangement, by which the receptacles are practically diœcious, obtains, as I have said, in a large proportion of the species of *Ficus*. There is, however, a group of species (*Urostigma*) in which it does not obtain, and in which male, fertile female, and gall flowers are contained in the same receptacle. In this group the difference in structure in the early stages between gall and fertile female flowers is very slight, and in some cases I could find no difference whatever. And even the ripe achenes of the fertile females are in many cases undistinguishable externally from the ovaries containing far advanced pupæ, and it is only by cutting them open that they can be recognised. As regards the relation in this group of *Urostigma* of the male flowers to the fertile female and gall flowers, there are two types of arrangement. In one set of species (of which *F. Bengalensis* and *tomentosa* are good examples) the male flowers are comparatively few in number, and are confined to a zone at the apex of the receptacle, just under the ostiolar scales; while in another set the male flowers are intermixed with the fertile female and gall flowers over the whole surface of the interior of the receptacle.

A third small group (*Synœcia*) has neuter flowers mixed with the fertile females in one set of receptacles; while the other set of receptacles contains only male and gall flowers. And a fourth group (which I have named *Palæomorphe*) has male flowers which, in addition to an anther, contain an insect-attacked or gall pistil. These pseudo-hermaphrodite flowers are confined to the sub-ostiolar zone, the remainder of the receptacle being occupied by gall flowers: while perfect female flowers occur in a distinct set of receptacles and are unaccompanied by any trace of male or gall flowers.

It appears to me that, in the peculiarities in the structure and arrangement of the flowers which I have above described, the evolutionary history of the genus *Ficus* may to some extent be traced. I have therefore ventured to arrange the Indo-Malayan species into two great groups, and to divide the second of these great groups into three sub-groups, according to their presumed seniority. Believing that hermaphroditism is an archaic and primitive condition from which the genus is in process of delivery, I look on its persistence, even in an imperfect form, as an indication of age. I have therefore separated off the ten species in which I find it regularly to occur into a distinct group. Of this group pseudo-hermaphroditism is the diagnostic mark, and to the section which these ten species form I have given the name *Palæomorphe*. It is true that in the whole of these ten species the pseudo-hermaphrodite flowers are confined to the same receptacles as the gall flowers, while the perfect females are confined to a distinct set of receptacles in which there is no trace of either males or galls, and that the receptacles are thus practically diœcious. Still it appears to me that the persistence of the rudimentary female organ in the male flowers must be taken as indicating a more primitive condition than the enclosure in the same receptacle of strictly unisexual male and female flowers (the arrangement obtaining in *Urostigma*). These ten species being disposed of in a group by themselves, I have formed the remaining species of Indo-Malayan *Ficus* into a group characterised by unisexual flowers. And that group I have divided into three sub-groups, according as the receptacles are monœcious, pseudo-monœcious, or practically diœcious, the practically diœcious sub-group being again subdivided into sections which are founded on the number of the stamens and the situation of the receptacles. For five of the seven sections into which I have thus thrown the Indo-Malayan species, I have adopted as sectional designations words previously in use as sectional or subgeneric names. For the first section, as already stated, I have invented a new name, which indicates what I believe to be its position in the evolution of the genus; and for the seventh I have also invented a new name, indicating its newness in point of evolution. The arrangement is as follows:—

GROUP I.—Pseudo-hermaphrodite: male flowers with 1 stamen and a rudimentary pistil. Pseudo-hermaphrodite flowers and gall flowers in one set of receptacles: fertile female flowers in another set . . . . *Palæomorphe.*

GROUP II.—Unisexual or asexual; male flowers without rudimentary pistils.

SECTION I.—Male, gall, and fertile female flowers on the same receptacle . . . . *Urostigma.*

SECTION II.—Flowers unisexual or neuter: male and gall flowers on one set of receptacles, fertile female and neuter flowers in another set . . . . *Synœcia.*

SECTION III.—Flowers unisexual: male and gall flowers in one set of receptacles, fertile female flowers only in another set—

A.—Flower monandrous—

- *a*, Receptacles chiefly axillary . . . . *Sycidium.*
- *β*, Receptacles mostly in fascicles from stem and branches . . . . . . *Covellia.*

B.—Flowers di-, rarely triandrous—

- *a*, Receptacles mostly axillary . . . . . *Eusyce.*
- *β*, Receptacles mostly in fascicles from stem and branches . . . . *Neomorphe.*

These seven sections are not all equally natural. The most natural of them are *Urostigma* and *Synœcia*. The coincidence in *Urostigma* of such apparently unconnected characters as the monœcious condition of the axillary paired receptacles and the epiphytal habit is very remarkable. In no other section is the tendency to be epiphytal at all strongly marked: in *Urostigma* it is universal. Many species in other sections are scandent and support themselves on trees and rocks by throwing out rootlets from their stems and branches. But these rootlets are furnished with fibrillæ and collecting hairs like the roots that penetrate the soil, and are very different in appearance from the strong subdivisions of the main axis by which the epiphyte embraces, and ultimately strangles, the tree to which it attaches itself. The name *Urostigma* was originally devised by Gasparrini.

It is the only one of his genera the characters of which pretty nearly agree with those of any of my sections.

The few species which form the section *Synœcia* are climbers with remarkably large and handsome receptacles. The characteristic neuter flowers in all respects resemble the male flowers, except that they have no anther. In one species (*apiocarpa*) the neuter flowers are absent. The affinities of that species are, however, so clearly with the others in the section *Synœcia*, that I include it without hesitation, believing it to form a connecting link with the more markedly diœcious sections. The name *Synœcia* is adopted from Miquel, and the characters of his sub-genus of that name are nearly those of my section. The section *Sycidium* comprehends a number of species with comparatively small receptacles and rather harsh or scabrid leaves. It forms on the whole a pretty natural section. At the end of it I have put, as a matter of convenience, a few species which belong to different types from the main body. The species brought together in my *Sycidium* are for the most part the same as those which Miquel (who made it a section of his *Eusyce*) included in his *Sycidium*. *Covellia* is a natural section, including two types—one with a tendency to axillary, the other with a tendency to hypogeal inflorescence. The name *Covellia* was originally given by Gasparrini as a generic one to a species of the former type. *Eusyce* is the most artificial of the sections, and the one with which I am least satisfied. The name was originally given to characterise a sub-genus which Miquel founded on rather vague characters. There are several types under the section which, by further study, may be satisfactorily separated off into distinct sections. *Neomorphe* is a small and natural section, consisting of species with large receptacles borne on the stem or larger branches. It includes plants which would have gone into Gasparrini's genera *Sycomorus* and *Cystogyne*. In it there is included one species (*F. glomerata*) which, although its affinities are clearly with the other species included in this section, has monœcious receptacles, as in *Urostigma*.

To complete this brief account of the morphology of the genus it is necessary to refer to the remaining organs. The leaves of *Ficus* are for the most part alternate; but in a few species they are opposite. They have a characteristic *facies*, of which it is not easy to give an account in words, although it affords ready help both in the field and in the herbarium when one has become familiar with it. Stipules are universally present, although in some cases they are very fugacious. There are three distinct kinds of so-called "stipules" in the genus. The most truly stipular of these appendages are those which occur in pairs at the origin of the leaves from the axis (one on each side). Examples of this kind are found in many of the scandent species, as for example in *F. lasiocarpa*, and in many of the receptacle-bearing branches in *Covellia*. The second kind of stipule (the so-called "intrapetiolar") is really a kind of leaf-scale (occurring only in species with alternate leaves) which, completely embracing the leaf-bearing axis at its base, covers the young leaf and falls off as the latter becomes developed. This kind of stipule attains its highest development in the familiar *F. elastica*, and in that species it persists for an unusually long period. Stipules of the third kind are rarely seen in herbarium specimens. They are really leaf-scales, which are present in considerable numbers as coverings to the leaf-buds in the truly deciduous species (e.g. *F. infectoria* and *F. tjakela*), as well as in those which, although not deciduous, make their growth only during clearly defined periods (e.g. *F. bracteata*).

The whole of the Indo-Malayan species of which I have seen living specimens contain milky juice except *F. leucantatoma*, and in that species the juice is of a pale buff colour.

In the following attempt to arrange the Indo-Malayan species of *Ficus* I have described a few novelties, chiefly from the superb Malayan collections of Signor Beccari, who most generously put his material at my disposal. Herr H. H. Kunstler's fine collections from Perak have also yielded some new forms. By far the most laborious part of my work has consisted in disentangling and reducing the rather formidable synonymy with which the literature of the genus is loaded. For the purpose of doing this thoroughly, I went very carefully over the whole of the figs in the splendid Malayan collections at Leiden and Utrecht, and at Buitenzorg in Java. The materials in M. de Candolle's herbarium and in the collections at Florence and at the British Museum were also most carefully examined. The herbaria at Kew and Calcutta are very rich in Indian species, and the former contains many of the types of Miquel's Indian species. The types of Miquel's Malayan species are mostly at Utrecht, and those of Blume and Reinwardt at Leiden. By taking a large suite of specimens of my own along with me, and by comparing these with the types in the collections just mentioned, I have been able, as I hope successfully, to reduce a good deal of the synonymy. The excessive multiplication of names in this genus is largely due to the fact that trivial variations from the typical form of a species have been considered sufficient warrant for the formation of new species. Some of the synonymy is due to downright carelessness, species already well-described having in not a few cases been described a second, and even a third and a fourth time under new names. A good deal of it is also due to authors having worked with very imperfect material. Botanists like Blume and Roxburgh, who described from living specimens, have made few slips compared with those who, like Miquel, worked on herbarium material only.

I have to acknowledge the valuable help given to me during the progress of my work by Mr. W. Botting Hemsley, Special Assistant for Indian Botany in the Kew Herbarium.

FICUS, Linn.

Flowers unisexual (staminiferous, pistiliferous, or gall), or pseudo-hermaphrodite, rarely asexual, collected in various ways on more or less globose ovoid or pyriform concave receptacles which are closed at the apex by numerous bracteoles. Male flowers with 1, 2, or rarely 3 exserted or included ovate or oblong stamens, without rudimentary pistil (except in *Palæomorphe*), the perianth of 2 to 6 distinct pieces, or gamophyllous and 2- to 6-partite, or absent. Fertile female flowers with a single pistil and without rudimentary stamens, the ovary 1-celled with 1 pendulous ovule, the style more or less lateral, longer than the ovary and surmounted by the clavate cylindric peltate or bifid stigma, the perianth of 2 to 6 distinct pieces, or gamophyllous 2- to 6-partite, or absent; achenes more or less obovoid or reniform, rarely globular, with a minutely tuberculate or undulate hard pericarp, often with a glairy or mucilaginous outer coat; the seed pendulous, with small albumen, the embryo more or less curved. Gall flowers similar to the fertile females, but not containing embryos, and often occupied by the pupa of a species of *Blastophaga* or other Hymenopterous insect; the ovary ovoid or globular, its pericarp thin and membranous, or thick, brittle, and crustaceous; the style shorter than in the fertile female, often dilated above into a more or less trumpet-shaped false stigma. Neuter flowers (occurring only in section *Synœcia*) pedicillate with perianth like the males, asexual. Male, gall and fertile female flowers collected on the same receptacle; or males and galls on a distinct set of receptacles, fertile females and neuters on another set: or males and galls on one set of receptacles and fertile females on a distinct set; flowers often mixed with scales or hairs. Receptacles usually homo- rarely di-morphous, closed at the mouth by numerous scales arranged in rows, the uppermost of which often partly project externally and form an umbilicus; the base rounded or narrowed and usually subtended by three bracts, sessile or pedunculate, in pairs in the axils of the leaves or of the scars of fallen leaves, solitary by abortion, or in fascicles from tubercles (shortened branchlets) from the main branches or stem, or on long subaphyllous branches proceeding from the stem near its base. Trees or shrubs with milky juice; leaves alternate, rarely opposite, stipulate, entire, serrate, dentate, or lobed; smooth, hairy, or scabrid; the leaf-buds sometimes covered by deciduous leaf-scales.

CONSPECTUS OF THE SECTIONS OF THE GENUS.

I. *Palæomorphe*.—Male flowers with 1 stamen and a rudimentary pistil occupying the same receptacles as the gall flowers: fertile female flowers alone in another set of receptacles: perianth of fertile females usually gamophyllous, 4 or 5-cleft (of separate pieces in *gibbosa* and *Decaisneana*); small trees, erect or sub-scandent shrubs.

II. *Urostigma*.—Male, fertile female, and gall flowers in the same receptacle; stamen 1; (stamens 2 in *callosa* and *vasculosa*); stigma elongate, usually acute; receptacles in the axils of the leaves or of the scars of fallen leaves, tribracteate at the base (except in *Kurzii*, *nervosa* and *pubinervis*); leaves alternate, entire, coriaceous or sub-coriaceous, rarely membranous; usually trees or powerful climbers; epiphytal at least in early life.

III. *Synœcia*.—Flowers unisexual or neuter: male flowers with 1 stamen: male and gall flowers in one set of receptacles, fertile female and neuter flowers in another set (neuters absent in *apiocarpa*); climbers with large coloured receptacles, the leaves tesselate beneath.

IV. *Sycidium*.—Flowers unisexual: male and gall flowers in one set of receptacles; fertile female flowers in a distinct set of receptacles; male flowers with 1 stamen (stamens sometimes 2 in *copiosa* and *cuspidata*). Leaves alternate; receptacles small, axillary, more or less scabrid (a few have receptacles in fascicles from the stem); shrubs, small trees or climbers; rarely epiphytal.

V. *Covellia*.—Flowers unisexual; male flowers in the same receptacles as the gall flowers, monandrous, the perianth of 3 or 4 distinct pieces: female flowers in separate receptacles from the males and galls, pedunculate or sessile, the perianth gamophyllous, much shorter than the ovary, or wanting (rarely consisting of 4 or 5 pieces); the receptacles on long sub-aphyllous branches issuing from near the base of the stem, often sub-hypogæal; or on shortened branchlets (tubercles) from the stem and larger branches; or axillary: shrubs or trees, never epiphytes or climbers.

VI. *Eusyce*.—Flowers unisexual, male and gall flowers in one set of receptacles, fertile female flowers in a distinct set of receptacles (except in *Thwaitesii*); male flowers with 2 stamens; receptacles small (except in Nos. 145, 150, 155, and 170), axillary; scandent or erect shrubs or small trees, rarely epiphytal; the leaves alternate, softly hairy or glabrous, not scabrid or hispid. (*There are* 3 *stamens in Nos.* 150 *and* 191 *and only* 1 *in No.* 192, *and sometimes also in No.* 174.)

VII. *Neomorphe*.—Flowers unisexual; male and gall flowers in one set of receptacles: fertile female flowers in a distinct set of receptacles: male flowers with 2 stamens, the perianth inflated, of 3 or 4 membranous pieces: fertile female flowers smaller than the male or gall flowers; receptacles often very large, in fascicles from tubercles on the stem and larger branches; trees, rarely scandent, never epiphytal.

SECTION I.—PALÆOMORPHE.

Palæomorphe.—*Male flowers with* 1 *stamen and a rudimentary pistil occupying the same receptacles as the gall flowers; fertile female flowers alone in another set of receptacles; perianth of fertile females usually gamophyllous,* 4- *or* 5-*cleft* (*of separate pieces in Nos.* 2 *and* 3), *small trees, or erect or sub-scandent shrubs.*

Leaves shortly and abruptly cuspidate, coarsely serrate towards the apex, receptacles small, numerous, in fascicles of 4 to 10 . . . . 1. *F. pisifera.*
Leaves inequilateral, varying from ovate-elliptic to rhomboid, their venation lucid . . . . 2. *F. gibbosa.*
Leaves ovate-lanceolate or elliptic, gradually tapering to the apex.
 Leaves narrowly elliptic-lanceolate, slightly papillose; receptacles without basal bracts; perianth of fertile female flowers of 5 pieces . . 3. *F. Decaisneana.*
 Leaves ovate-lanceolate, very papillose; receptacles with 3 basal bracts; perianth of female flowers gamophyllous . . . . 4. *F. adenosperma.*
Leaves with apices abruptly caudate, the tail narrow and at least an inch long; perianth of fertile female flowers gamophyllous.
 Leaves sessile, auricled at the base . . . . 5. *F. aurita.*
 Leaves shortly petiolate; the stipules subulate, more than an inch long, glabrous . . . . 6. *F. subulata.*
Leaves ovate-elliptic, 3 in. or more broad, secondary venation transverse.
 Receptacles and under surfaces of leaves tomentose . . . . 7. *F. lasiocarpa.*
 Receptacles hispid tomentose, under surfaces of leaves sub-scaberulous, glabrescent, or glabrous . . . . 8. *F. parietalis.*
Leaves ovate-elliptic, rarely so much as 2 in. broad, secondary venation not transverse; receptacles pedunculate, scabrid-hispid . . . . . . 9. *F. urophylla.*
Leaves slightly inequilateral, narrowly elliptic-lanceolate; receptacles subsessile, hispid; stipules tomentose . . . . 10. *F. Celebica.*

1. Ficus pisifera, *Wall. Cat.* 4504; *Miq. in Lond. Journ. Bot.* vii. 427; *Fl. Ind. Bat.* i. *pt.* 2. 301; *Ann. Mus. Lugd. Bat.* iii. 291.—*F. remblas*, Miq. (in part) Pl. Jungh. 61; Fl. Ind. Bat. i. pt. 2, 304.—*F. grewiæfolia*, Bl. Bijd. 475 (in part); Miq. Fl. Ind. Bat. i. pt. 2. 306; Ann. Mus. Lugd. Bat. iii. 273, 292 (in part).—*F. saxatilis*, Miq. (not of Bl.) in Zoll. Syst. Verz. 92.

—*F. anonæfolia*, Zipp. MSS. and probably *F. acuminatissima*, Miq. Lond. Journ. Bot. vii. 233.—*F. Tadjam*, Miq. Pl. Jungh. i. 62; Fl. Ind. Bat. i. pt. 2. 312. tab. xxc.—*F. microtus*, Miq. Fl. Ind. Bat. Supp. 174, 428; Ann. Mus. Lugd. Bat. iii. 273, 292.—*F. hypsophila*, Miq. (in part) Pl. Jungh. 60; Fl. Ind. Bat. i. pt. 2. 303.—*F. leucoxylon*, Miq. Pl. Jungh. 61. —*F. tondana*, Miq. Fl. Ind. Bat. i. pt. 2. 305.—*F. exasperata*, Roxb. Fl. Ind. iii. 555?

A shrub or small tree, the young branches scabrid-hispid; leaves shortly petiolate, membranous or almost coriaceous, inequilateral (the side next the stem being the narrower), elongated, sub-obovate or oblanceolate or elliptic-lanceolate, the apex acuminate or shortly cuspidate; margin remotely serrate-dentate, repand or sub-entire in the upper half, almost entire towards the 3-nerved, very unequal, narrowed base; lateral primary nerves 3 to 5 pairs, prominent and pale-coloured below; the whole of the lower surface sub-scabrid, minutely punctate, the reticulations distinct; upper surface smoother than the lower, the midrib and nerves puberulous, length from 4 to 7 in.; petioles ·2 to ·3 in. long; stipules 2 from the base of each leaf, lanceolate, acuminate, puberulous externally, from ·2 to ·3 in. long, persistent; receptacles pedunculate, numerous, in fascicles of 4 to 10, mostly from the axils of fallen leaves, globose, with umbilicus often sub-apert, scabrid or minutely verrucose; basal bracts usually absent; when ripe, red with yellowish dots and about ·2 to ·25 in. across; peduncles ·3 to ·4 in. long, slender, scabrid, occasionally with 1 or 2 scattered wart-like bracts; male flowers, only near the mouth of the receptacles containing gall flowers, with 1 stamen and an abortive or gall pistil, perianth of 4 pieces united by their bases; gall flowers with a perianth of 3 linear-lanceolate pieces, ovary obovoid, smooth, stipitate; style short, lateral; stigma clavate; perfect female florets in separate receptacles from the males, their perianth deeply 4-cleft, achene ovoid, style nearly terminal, stigma capitate.

Malayan Peninsula and Archipelago. Very common and variable.

This is very closely allied to *F. rostrata*, Lamk. in externals, but the structure of the flowers is different. The chief external marks to distinguish this from *rostrata* are that the leaves of this are more unequal-sided, the receptacles are more hispid and more generally pedunculate, and the habit is shrubby or arboreous.

The specimens named *F. grewiæfolia*, Bl., in Blume's Herbarium at Leiden belong mostly to this, but a few of them are referrible to *F. ampelas*, Burm.; and (although Blume's name *grewiæfolia* is the older) I have therefore taken Wallich's name of *pisifera* for this species. The specimens of *F. remblas*, Miq., at Leiden and Utrecht are partly referrible here and partly to *F. obscura*, Bl.

I think it highly probable that *F. exasperata*, Roxb. (of which a good MS. drawing made under Roxburgh's supervision exists in the Calcutta Herbarium) is the same as the plant issued by Wallich as *pisifera*. If this were absolutely certain, Roxburgh's name would of course take priority of Wallich's; but no authentic Roxburghian specimen of *exasperata* appears to be extant.

Plate 1.—*F. pisifera*, Wall.—Fruiting-twigs of three forms. 1, base of receptacle; 2, apex of receptacle; 3, stipules—*all of natural size*; 4, male flower with 1 stamen and 1 gall pistil; 5, gall flower from the same receptacle; 6, perfect female flower from another receptacle: 7, achene of the same: *Nos.* 4 *to* 7 *enlarged.*

2. Ficus gibbosa, *Bl. Bijd.* 466; *Miq. Pl. Jungh.* 62; *Fl. Ind. Bat.* i. *pt.* 2. 308.—

Var. *unigibba*, Miq. l.c. Supp. 430.—*F. rigida*, Bl. Bijd. 465.—*F. cuneata*, Bl. Bijd. 468.—*F. paradoxa*, Bl. Bijd. 467; Miq. Fl. Ind. Bat. i. pt. 2. 308.—*F. difformis* (Lam. ?), Benth. Fl. Hong-Kong, 327.—*F. altimeeraloo*, Roxb. MSS. in Herb. Calc.; Miq. in Lond. Journ. Bot. vii. 435; Fl Ind. Bat. i pt. 2. 311; Ann. Mus. Lugd. Bat. iii. 277, 293 (partly).—*F. excelsa* (Vahl ?), Roxb. Fl. Ind. iii. 552 (excl. syn. Rheede); Kurz For Flora Brit. Burm. ii. 451.—*F. excelsa*, Wall. Cat. 4477A, B, C, D.—*F. diversifolia*, Reinw. (non Bl.).—*F. sub-obliqua*, Miq. Ann. Mus. Lugd. Bat. iii. 225, 293.—*F. aitimeeraloo*, Roxb. (*excelsa*, Vahl.), Wight. Ic. 650.

A tree, the leaves varying much as to form and surfaces, always with prominent and usually (except in var. *parasitica*) more or less lucid nervation and venation; the young branches scaberulous, often pubescent; leaves petiolate, more or less coriaceous, usually inequilateral, from ovate-elliptic or lanceolate-elliptic to rhomboidal, occasionally oblanceolate-elliptic, or gibbous towards the base at one or both sides; edges always entire and often revolute; apex obtuse, rounded, with or without a short acumen, or gradually narrowed to a rather blunt, rarely to a long sharp point; base 3-nerved, cuneate-acute or bluntish, never rounded, often unequal; lateral nerves 3 to 7 pairs (rarely more), always prominent; intermediate nerves and reticulations distinct, from lucid pale-coloured and shining to (in vars. *cuspidata* and *parasitica*) dull and neither shining nor coloured; lower surface firm, often more or less harsh from the prominent venation, glabrous, or minutely tuberculate to minutely hispid (in var. *parasitica*); upper surface glabrous, shining to dull, and (in var. *parasitica*) minutely hispid especially on the midrib and nerves; length from 2·5 in. to 8 in.; petioles ·3 to ·4 in. long; stipules ovate-lanceolate, convolute, slightly curved, from ·3 to ·5 in. long. Receptacles pedunculate, axillary, solitary, in pairs, or in small umbellate fascicles from the branches below the leaves (often at the forks of the branches), depressed-globular or globular-pyriform, mammillate, with rather a prominent, often apert umbilicus, minutely verrucose, sub-scabrid or scabrid, without basal bracts; when ripe yellow and from ·2 to ·3 in. across; peduncles ·2 to ·4 in. long, puberulous, with a few bracteoles at their bases; male flowers only near the mouth of the receptacles containing gall flowers; perianth of male flower of 4 to 6 linear, fleshy, hairy pieces; stamen 1, with a short filament, which is united by its base to an abortive (insect-attacked) pistil; gall flowers with perianth similar to the male flowers, the ovary globular, smooth, the style short, lateral; fertile female flowers, in separate receptacles, with a thin hyaline perianth of 4 linear, slightly hairy pieces, the achene slightly papillose, obliquely ovoid, style elongate, lateral.

India, near the bases of all the hill ranges in the country, through the Khasi Hills, Chittagong, and Burmah to the Malayan Peninsula and Archipelago; also in Hong-Kong. A very widely distributed and most variable species. Blume made four species out of the Malayan forms of this, of all of which I have seen the types in the Dutch herbaria. Of Blume's four names, *F. gibbosa* is that here retained for the species, as being the one which has got most widely into use, and which is, moreover, a descriptive name. Roxburgh, Wallich, and Kurz consider that this is the plant named *excelsa* by Vahl., and Mr. Bentham (*Fl. Hong-Kong*, 327) thinks it is probably *F. difformis* of Lamark. But the types of these two older species have apparently been lost, and it appears safer to relegate them both to doubtful species. In adopting Blume's name of *gibbosa* we are on firm ground, Blume's types being at Leiden. The forms of this Protean plant arrange themselves into four groups, as follows:—

1. TYPICAL GIBBOSA, Bl. (with synonyms as above).—Leaves very variable in shape, glabrous, shining, and (when dry) coloured beneath, the midrib, nerves, veins

and reticulations being pale, the rest of the lower surface purplish-brown. Malayan Islands and Peninsula.

2. VAR. CUSPIDIFERA (spec. Miq. Lond. Journ. Bot. vii. 434).—*F. excelsa*, Wall. Cat. 4477F.—*F. laeta*, Decais. N. Ann. Mus. iii. 495 (in part).—*F. reticulosa*, Miq. Lond. Journ. Bot. vii. 435.—*F. pervia*, Miq. Lond. Journ. Bot. vii. 433; Ann. Mus. Lugd. Bat. iii. 293; Wall. Cat. 4477D.—*? F. chincha*, Roxb. Fl. Ind. iii. 534.—*Altimeeraloo*, Rumph. Herb. Amb. iii. 58.

Leaves elongate, gradually narrowed above, and more or less acuminate; slightly rough below from minute tubercles, not shining, and but little coloured.

Burmah, Chittagong, base of the Himalayas; mountain ranges of Southern India, Ceylon: rare in the Malayan region, where it has been collected only in Timor and the specimens have been named *F. laeta* by Decaisne.

3. VAR. PARASITICA (spec. Koenig in Willd. Act. Berol. 1798. 25. tab. 3), Vahl. Enum. ii. 188; Wall. Cat. 4476A, B, C, D; Miq. in Lond. Journ. Bot. vii. 433; Fl. Ind. Bat. i. pt. 2. 310; Ann. Mus. Lugd. Bat. iii. 276, 292; Brandis For. Flora 420.—*F. ampelos*, *Koenig* (*Herb. Russ.*) in Roxb. Fl. Ind. iii. 553; Wight Ic. 652.—*? F. sclerophylla*, Roxb. Fl. Ind. iii. 546.

Leaves broad, more or less sub-rhomboid or rhomboid, scabrid or sub-scabrid on both surfaces, minutely tomentose-hispid below, and minutely hispid above.

Peninsular and Central India; Behar.

4. VAR. TUBERCULATA [spec. Roxb. (non Miq.), Fl. Ind. iii. 554]; Wight Ic. 651; Miq. Ann. Mus. Lugd. Bat. iii. 293.—*F. angulata*, Miq. Lond. Journ. Bot. vii. 434.

Very like var. *parasitica*, but with narrower leaves, which are sometimes irregularly serrate.

Ceylon and forests of Western India (not common),—*Thwaites*, C. P. 2227.

In the Nilgiri Hills and Ceylon a form occurs which connects the varieties *cuspidifera* and *parasitica.*

Cuming's specimens from the Philippines (*Herb. Cum.* 1922 and 1923), referred to as *F. altimeeraloo* by Miquel (*Lond. Journ. Bot.* vii. 435), are *F. rapiformis*, Roxb. (*leucantatoma*, Poir.)

PLATE 2.—*F. gibbosa*, Bl., typical; twigs of three forms. 1 & 2, receptacles seen from above; 3, lateral view of receptacles; 4 & 5, stipules—*all of natural size*; 6, male flower with gall pistil; 7, fertile female flower: *both enlarged.*

PLATE 2*a*.—*F. gibbosa*, Bl., var. *cuspidifera*; twigs of three forms. 1, receptacle seen from above; 2, the same from below; 3, stipules—*all of natural size*; 4, male flower with gall pistil; 5, gall flower; 6, fertile female flower: *all enlarged.*

PLATE 2*b*.—*Ficus gibbosa*, Bl. A.—Var. *parasitica*, fruiting-twig; B.—Var. *tuberculata*, fruiting-twig. 1, apex of receptacle; 2, base of the same; 3, stipules—*all of natural size*; 4, fertile female flower (young): *enlarged.*

3. FICUS DECAISNEANA, *Miq. Fl. Ind. Bat.* i. *pt.* 2. 312; *Ann. Mus. Lugd. Bat.* iii. 292.—*F. laeta*, Decne. N. Ann. Mus. iii. 495 (partly).—*F. trematocarpa*, Miq. Ann. Mus. Lugd. Bat. iii. 224, 292.—*F. firmula*, Miq. l. c. 224, 292.—*F. Philippensis*, Miq. Lond. Journ. Bot. vii. 435; Ann. Mus. Lugd. Bat. iii. 293.

A shrub, all parts glabrous; leaves sub-coriaceous, short-petiolate, elliptic lanceolate, with entire edges, shortly cuspidate apex, and acute, 3-nerved base; lateral primary nerves about 8 pairs, with the veins and fine reticulations distinct and pale coloured below; both surfaces glabrous, the lower minutely tuberculate; length 3 to 7 in.; petioles thick, about ·35 in. long; stipules linear-subulate, convolute, curving away from the axis like those of *F. subulata*, a little longer than the petiole; receptacles short-pedunculate, in pairs (or solitary by abortion), axillary, umbonate (especially when young); when ripe ovoid or sub-globose, smooth or sub-verrucellate, ebracteate at the base; from ·2 to ·3 in. across; pedicils ·15 to ·25 in. long, with several minute bracts at their bases; male flowers (only in the receptacles containing gall flowers), sessile, with a 4-leaved perianth, a single stamen, and an insect-attacked (*i.e.* gall), smooth, globular pistil; gall flowers pedicillate, with a gamophyllous 3-toothed perianth, the ovary globular, smooth, with a short lateral style, and capitate stigma; fertile female flowers (in separate receptacles from the males) with a perianth of 5 lanceolate leaves, the achene ovate, style elongate lateral, stigma capitate.

VAR. TREMATOCARPA.

Receptacles globose-umbonate, umbilicus often apert from the disappearance of the scales at its mouth; stipules much longer than the petiole.—*F. trematocarpa*, Miq.

VAR. FIRMULA.

Receptacles ovoid-umbonate, umbilical scales persistent.—*F. firmula*, Miq.

Both these varieties have leaves of a thicker texture than typical *Decaisneana*, Miq., but, after much careful examination of Miquel's original materials in the Leiden Herbarium, I cannot believe that they are specifically distinct from each other, or that they are more than geographical varieties of *F. Decaisneana*, Miq.

Typical *Decaisneana* is known only from Timor and New Guinea; *trematocarpa* from Amboina; and *firmula* from Celebes and Amboina. This species is related to *F. adenosperma*, Miq.

PLATE 3.—A.—*F. Decaisneana*, Miq. Fruiting-twig, typical form. B.—Var. *trematocarpa*. C.—Var. *firmula*. 1, stipules—*all of natural size*; 2, male flower with gall pistil and 4-leaved perianth; 3, fertile female flower; 4, fertile achene; 5, gall flower: *all enlarged*.

4. FICUS ADENOSPERMA, *Miq. in Ann. Mus. Lugd. Bat.* iii. 233, 206.

A tree, the young shoots covered with deciduous tawny tomentum; leaves membranous, petiolate, ovate-lanceolate, acute, the margin entire, base acute 3-nerved; primary lateral nerves about 7 pairs, prominent, and, like the midrib, adpressed-hairy beneath; the rest of the lower surface glabrous; upper surfaces glabrous, minutely papillose; length of blade 3 to 4 in.; petiole ·3 in.; stipules linear-lanceolate, scarious, glabrous, ·6 in. long; receptacles pedunculate, in pairs, axillary, depressed-globose, slightly constricted below, pubescent when young, nearly glabrous when old; ·3 in. across; the umbilical bracts large and glabrous; bracts at the base of the constricted part of the receptacle 3, minute; peduncle proper ·1 in. long; male flowers few and only in the receptacles with the gall flowers, sessile, the perianth of 4 broad distinct pieces; stamen 1, the anther ovate-rotund; gall flowers ovate to globular, smooth, those near the mouth of the receptacle often associated in the same flower with an abortive anther, style short, lateral, stigma tubular; fertile female flowers in separate receptacles from the males (? on separate plants) with a 5 cleft gamophyllous perianth, achene ovoid-elliptic, rugose, style sub-terminal, stigma cylindric.

Celebes,—*Teysmann*; Amboina,—*De Fretes*; Ternate,—*De Vriese.*

This species resembles *F. Decaisneana*, but in that the leaves are not so much papillose as in this, and the receptacles of that are glabrous, while in this the receptacles are pubescent; in that there are no basal bracts, in this there are 3 at the junction of the constricted part of the receptacle with the peduncle proper.

PLATE 4.—Branch of *F. adenosperma*, Miq., with ripe receptacles. 1, receptacle; 2, apex of the same; 3, stipules—*all of natural size*; 4, male flower; 5, gall pistil and rudimentary anther within the same perianth; 6, insect-attacked ovary; 7, perianth of fertile female flower; 8, fertile achene: *all enlarged.*

5. FICUS AURITA, *Reinw. Bl. Bijd.* 462; *Miq. in Ann. Mus. Lugd. Bat.* iii. 274, 292.

A shrub, the young branches softly puberulous; leaves almost sessile, oblong or elliptic, slightly inequilateral, rather suddenly contracted at the apex into a long narrow tail nearly an inch long; edges entire, slightly wavy; narrowed below the middle to the faintly 4-nerved base, which is slightly auricled on the outer side, the auricle being decurrent on the short petiole; primary lateral nerves 9 to 12 pairs, like the midrib prominent beneath and diverging from the latter at rather a high angle; lower surface of a pale yellowish-green when dried, softly puberulous, the reticulations distinct, rather open; upper surface glabrous; petiole tomentose, only about ·2 in. long; stipules lanceolate, convolute, pubescent; receptacles in pairs from the axils of fallen leaves, shortly pedunculate, globose, apex slightly umbonate; when ripe smooth, ·25 in. across; without basal bracts; peduncles about ·25 in. long; male flowers (only in receptacles with gall flowers) with an irregularly 5-cleft perianth, 1 short, broad stamen and an insect-attacked pistil; perfect (fertile) achenes unknown.

Amboina,—*Teysmann*; Moluccas,—*Reinwardt* (*fide* Blume); New Guinea,—*Zippel* (*fide* Miquel).

This species is very badly represented in collections. In the Royal Herbarium at Leiden there are good fruiting specimens collected by Reinwardt, and from one of these the foregoing description was drawn up. In the Buitenzorg Herbarium there are specimens collected by Teysmann in Amboina. Miquel (*Ann. Mus.* l.c.) mentions specimens collected in New Guinea by Zippel which he believes to belong to this. In Blume's original description the species is described as scandent, but it is probably sometimes epiphytal and sometimes grows in the ground.

PLATE 5.—Fruiting-branch *of F. aurita*, Reinw. 1, receptacle seen from the side; 2, apex of the same; 3, stipules—*all of natural size*; 4, male perianth; 5, stamen and insect-attacked pistil of male flower: *enlarged.*

6. FICUS SUBULATA, *Bl. Bijd.* 461; *Miq. Fl. Ind. Bat.* i. *pt.* 2. 311; *Ann. Mus. Lugd. Bat.* iii. 275, 292.—*F. acuminata*, Roxb. Fl. Ind. iii. 538; Wall. Cat. 4478.—*F. ancolana*, Miq. Pl. Jungh. 62.—*F. virgata*, Reinw. (not of Miq.), in Bl. Bijd. 454.

A semi-scandent or straggling shrub, the young parts puberulous; leaves short-petiolate, membranous, elliptic, elliptic-lanceolate, or sub-obovate-elliptic, sometimes slightly inequilateral; apex rather abruptly and shortly cuspidate; edges entire, waved; base acute, 3-nerved (with occasionally several subsidiary nervelets); lateral primary nerves 7 to 10 pairs, rather prominent below; in the adult leaves both surfaces are glabrous, dull when dry, the lower rather pale coloured; length of blade 4·5 to 10 in.; petioles about ·3 in. long, stout, scaberulous; stipules conspicuously convolute, subulate, curving away from the axis, usually more than three times as long as the petiole. Receptacles axillary, short-pedunculate, sometimes almost sessile, in pairs (solitary by abortion) or in fascicles; those bearing male flowers ovoid and with the umbilicus rather prominent, the umbilical bracts numerous; those bearing fertile female flowers globose when ripe; both forms scaberulous, obsoletely verrucose, orange-red, without basal bracts, but with a few bracts scattered irregularly along the sides; about ·4 in. across; peduncles short, with numerous bracteoles at their bases, male flowers (occurring only in the ovoid receptacles with the gall flowers), the perianth thick, fleshy, tubular, with 4 rather short teeth; stamen 1, the anther broad, pistil globular, insect-attacked; gall flowers pedicillate, the perianth like that of the male, achene sub-globular, smooth, style short, lateral, stigma capitate; fertile female flowers (in globular receptacles in which there are no male flowers), the perianth hairy, gamophyllous, with 4 long teeth, achene oblong, style lateral, stigma elongate.

From Chittagong southward to the Malayan Archipelago, at elevations of from 1,000 to 4,500 ft.; also in the Phillippines and in Lo Fau Shau: presenting little variation and readily recognised by the long, subulate, convolute stipules, which always curve away from the axis. Roxburgh found the lanceolate-elliptic leaved form of this in Chittagong and named it *F. acuminata*. Miquel's species *F. tadjam* was ultimately reduced to this by himself, but in my opinion it more resembles *F. pisifera*, Wall., to which I have reduced it. *F. ancolana* of the same author is a luxuriant, rather broad-leaved form, which in his final revision of the genus he himself reduced to this. *F. virgata*, Reinw. (not of Miq.), of which an authentic specimen exists in the Leiden Herbarium, appears to me to be reducible here, as do some of the specimens (e.g. *Oldham*, *Formosa*, 541) referred by Maximowicz to *F. insularis*, Miq.

This is a truly diœcious species. Male flowers are found only in the ovoid receptacles, and they lie, as usual, between the scales that close the mouth of the receptacle, the whole of the rest of the interior being filled by insect-attacked female (*i.e.* gall) flowers, and the plants bearing these ovoid receptacles are erect shrubs growing in the ground. Female flowers producing fertile achenes, on the other hand, are found only in the globular receptacles, the entire interior of which they occupy, no trace whatever being found of a male flower. Moreover, the plants bearing the round receptacles are semi-scandent epiphytes, not erect shrubs growing in soil.

PLATE 6.—*F. subulata*, Bl. A.—Twig bearing receptacles which contain perfect male and gall flowers. B.—Twig bearing fertile female flowers: *of natural size.*

1, male flower, containing 1 stamen and 1 insect-attacked pistil; 2 & 3, perianth of female flower; 4, unripe achene; 5, ripe fertile achene: *enlarged.*

7. FICUS LASIOCARPA, *Miq. Fl. Ind. Bat. Supp.* 175, 429; *Ann. Mus. Lugd. Bat.* iii. 278, 293.—*F. lasiophlebia*, Miq. l.c. 427.

Scandent? The young branches densely but deciduously fulvous-tomentose; leaves coriaceous, shortly petiolate, often slightly inequilateral, elongate, ovate-elliptic or oblong, suddenly contracted at the apex into a long narrow acumen; edges entire, revolute; base rather broad, blunt, often oblique, 3- to 5-nerved; lateral primary nerves about 4 pairs, prominent below, intermediate or secondary nerves parallel, rather straight; the whole of the lower surface (but especially the midrib, nerves, and reticulations) tomentose; upper surface shining, hard, smooth; length of blade 5 to 10 in.; petioles stout, densely tomentose, ·3 to ·4 in. long; stipules 2 to each leaf, lanceolate, tomentose externally, from ·3 in. to ·5 in.

long; receptacles sessile, axillary, in pairs, often very close together, ovoid, without basal bracts, densely covered with long, yellowish, soft, flocculent tomentum; about ·35 in. across; [male flowers not found] gall flowers pedicillate; the perianth of 3 narrowly lanceolate pieces, achene smooth, sub-globular, style short, lateral, stigma dilated; fertile female flowers occupying the whole cavity of different receptacles from the former, sub-sessile; the perianth campanulate with 4 lanceolate unequal segments, the achene ovoid, the style lateral, rather short, stigma sub-cylindric.

Western Sumatra,—*Teysmann.*

A species closely allied to *F. parietalis*, Bl., but distinguished from that species by the dense tomentum of its receptacles and of the under surfaces of the leaves.

Not having many receptacles for dissection, I have been unable to find male flowers. These doubtless occupy the usual situation under the scales of the mouth in the receptacles of which gall flowers occupy the lower part. From the great similarity of this to the next species, I assume that its male flowers will be found to be pseudo-hermaphrodite, and I therefore place it in this group.

PLATE 7.—*F. lasiocarpa*, Miq. Branch with mature receptacles. 1, lateral view of receptacle; 2, apex of the same; 3, stipules—*all of natural size*; 4, gall flower; 5 fertile female flower (from another receptacle); 6, achene of the same: *all enlarged.*

8. FICUS PARIETALIS, *Bl. Bijd.* 462 (*excl. var.*); *Miq. Fl. Ind. Bat.* i. *pt.* 2. 307; *Ann. Mus. Lugd. Bat.* iii. 277, 293.—*F. Junghuhniana*, Miq., and *F. rufipila*, Miq., Pl. Jungh. 56, 57.—*F. concentrica*, Van Hasselt MSS., Miq. Choix de pl. de Buitenzorg t. 11.—*F. cerasiformis*, Desf. Cat. Hort. Paris ed. 3. 413; Miq. in Lond. Journ. Bot. vii. 428; Lem. Illust. Hortic. V. t. 167.—*F. acuminata*, Bot. Mag. t. 3282 (not of Roxb.).—*F. phlebophylla*, Miq. Fl. Ind. Bat. Supp. 174, 430.—*F. grandifolia*, Wall. Cat. 4525; Miq. in Lond. Journ. Bot. vii. 432.—*F. Tabing*, Miq. Fl. Ind. Bat. Supp. 174, 430.

A shrub or tree, often epiphytal; the young branches, receptacles, petioles, and under surfaces of the leaves rufescent-pubescent, sometimes rather scaberulous; leaves coriaceous, petiolate, oblong-elliptic, ovate-elliptic, rarely obovate-elliptic, sometimes inequilateral; apex rather abruptly and shortly linear-acuminate; edges entire, revolute; base rounded, blunt, or acute, sometimes sub-cordate, 3- to 5 nerved; primary lateral nerves 2 to 3 pairs, intermediate nerves transverse, reticulations distinct, all strongly prominent on the under surface, the whole of which when young is covered with short straight hairs, many (sometimes all) of which disappear with age, leaving the under surface hard, sub-scaberulous, glabrous, or glabrescent; upper surface glabrous, smooth, shining, much darker than the lower; length of blade from 3 to as many as 12 in.; petioles stout, hispid-pubescent, from ·3 to ·5 in. long; stipules small, ovate-acute, hirsute, about ·3 in. long; receptacles pedunculate, axillary, in pairs (solitary by abortion), globose, or ovoid, tapering towards the ebracteate base, apex rather strongly umbonate especially when young, hispid-tomentose; when ripe yellow or orange, from ·3 to ·4 in. across; peduncles hispid, about ·5 in. long, sometimes with 2 or 3 small ovate-acute bracts at their insertion on the stem; male flowers few, lying under the scales of the mouth in the receptacles with the gall flowers, the perianth gamophyllous, with 5 narrow, elongate segments; stamen 1, invariably united by the base of its filament to the pedicel of an abortive pistil; gall flowers when mature large, rounded, with a short lateral style and dilated stigma, the perianth as in the male; fertile female flowers with a gamophyllous perianth deeply divided into three linear-lanceolate segments, the achene reniform-ovoid with a rather long sub-terminal style and cylindrical stigma.

Malayan Peninsula and Archipelago.

This varies within certain narrow limits and by no means in proportion to the number of names which have been given to it; it is always recognizable by its strongly transverse-veined leaves and hispid, tomentose, pedicilled receptacles. It is allied to *F. urophylla* in externals, as well as in the fact that the single anther of the male flowers is invariably accompanied by an abortive pistil. A verylarge-leaveds pecimen of this from Penang, differing in no particular from Blume's type, was issued as *F. grandifolia* by Wallich, who had probably never seen Blume's typical plant. Miquel's species *phlebophylla* was founded on a specimen from Sumatra with large oblong-elliptic leaves. *F. rufipila* and *Junghuhniana* of the same author have leaves with broader, often sub-cordate bases, and hairier than usual; otherwise they are exactly like Blume's plant. A curious variety, with concentric rings on the exterior of the receptacles, is figured in Miquel's *Choix de Plantes de Buitenzorg.* A plant exactly like that figured in Bot. Mag. t. 3282 as *acuminata* and *cerasiformis* may still be seen (1884) in cultivation under the latter name in the Botanic Garden at Utrecht. The receptacles containing the male and gall flowers are slightly larger and more umbonate than those in which the fertile female flowers are collected.

Plate 8.—*F. parietalis*, Bl. A.—Fruiting-twig with young receptacles containing fertile female flowers. B.—Leaf and receptacle of the form named *F. concentrica* by Van Hasselt. 1, receptacles containing male and gall flowers—*of natural size*; 3, perianth of male flower (expanded); 4, anther and abortive pistil from the same; 5, gall flower; 6, fertile female flower; 7 ripe achene from the last—*enlarged.*

9. Ficus urophylla, Wall. Cat. 4483; *Miq. in Lond. Journ. Bot.* vii. 429; *Fl. Ind. Bat.* i. *pt.* 2. 306.

An erect shrub or small tree; the young branches and petioles scurfy or sub-scabrid when dry; the receptacles more or less harsh; leaves sub-coriaceous, broadly ovate or ovate-elliptic, the apex with sudden long or short narrow tail, the edges usually entire, sometimes sinuate towards the apex, the base always entire, gradually narrowed to the petiole, 3-nerved; lateral primary nerves 2 or 3 pairs, and like the midrib and secondary nerves bold and harsh beneath; upper surface of leaf smooth and shining, lower dull and harsh; length of blade 2·5 to 4 in.; petioles ·25 in. to ·4 in.; stipules subulate, minute; receptacles shortly pedunculate, axillary, sub-globular, umbonate, scabrid-hispid, without basal bracts, reddish-yellow when ripe; ·2 to ·3 in. in diameter; peduncle hispid-hirsute, from ·2 in. to ·4 in. long; male flowers with perianth of 4 pieces, stamen 1, invariably jointed to a rudimentary pistil; female perianth 3-cleft, fertile achene obliquely ovoid, rough, the style short, diverging; barren (gall) achene smooth, globular, the style short, slightly hooked.

Assam, Khasi, Chittagong, Burmah, and Malaya.

This species in external characters almost exactly resembles *F. rostrata*, Lamk. (see under that species). These two afford an excellent example of agreement in externals being associated with considerable difference in the flowers.

Plate 9.—*F. urophylla*, Wall. A.—Twig with pedunculate immature receptacles. B.—Leaf of another form, also with immature sessile receptacles. C.—Leaf of a third form,

with mature pedunculate receptacles. D.—Group of mature receptacles—*of natural size.* 1, male flower with rudimentary pistil; 2, gall flower, *from the same receptacle*; 3, young female flower; 4, perfect achene *from another receptacle*: *all enlarged.*

10. FICUS CELEBICA, *Bl. Bijd.* 461; *Miq. Fl. Ind. Bat.* i. *pt.* 2. 313; *Miq. Ann. Mus. Lugd. Bat.* iii. 274, 292.—*F. lancifolia*, Miq. in Lond. Journ. Bot. vii. 452; Ann. Mus. Lugd. Bat. iii. 292.

A sprawling, almost scandent shrub; the young branches rufous or tawny, hispid hirsute, but with pale-coloured bark; leaves membranous, shortly petiolate, slightly inequilateral, narrowly elliptic-lanceolate, gradually tapering to the long caudate-acuminate apex; base acute or acuminate, often minutely auricled, 3- to 5-nerved (2 of the nerves being very minute); edges remotely and rather irregularly serrate, entire towards the base; lateral primary nerves 4 to 6 pairs; the midribs, veins, and reticulations prominent below and covered with short rufous hairs; remainder of the under surface minutely papillose; upper surface also minutely papillose, glabrous; length of blade 4 to 7 in.; petioles ·15 to ·25 in., hirsute; stipules subulate, tomentose, about three times as long as the petioles; receptacles very shortly pedunculate, axillary or from above the scars of fallen leaves, solitary, in pairs, or in fascicles of 4 to 6; ovoid and mammillate when young, sub-globose when mature, with rather prominent semi-apert umbilicus, covered with long, rather stiff, straight, yellowish, partly deciduous hairs; whitish in colour and about ·2 in. across; basal bracts absent; peduncle from ·05 to ·1 in. long; male flowers only in receptacles with gall flowers with 1 stamen and 1 abortive pistil, perianth 3- to 5-cleft; gall flowers with gamophyllous 3-cleft perianth, the ovary stipitate, ovoid, smooth, with rather long lateral style; fertile female flowers not seen.

Celebes,—*De Vriese, Teysmann*; Philippines,—*Cuming*; Perak,—*Kunstler* (*King's Collector*, 3927).

Most of the specimens from the Celebes have solitary receptacles with distinct peduncles, and the leaves taper very much to either end. The Perak specimens have fascicled fruit with less tapering leaves, and they bring this species into relation with *F. pisifera*, Wall., of which it must be a near ally. It is also closely related to *F. obscura*, Bl., through the form on which Blume founded his species *scaberrima* and which I have reduced to *obscura*. *F. lancifolia*, Miq., is represented at Kew by a specimen from the Philippines (*Cuming*, 1944) named by Miquel's own hand. It is in my opinion *F. celebica*, Bl.

VAR. KUNSTLERI.

Leaves shortly acuminate at the apex; the base little tapering; receptacles globular, often fascicled.

PLATE 10.—Fruiting-branch of *F. celebica*, Miq. A.—Var. *Kunstleri.* 1, receptacle seen from the side; 2, apex of receptacle—*of natural size*; 3, perianth of male flower; 4, anther and abortive pistil of the same; 5, perianth of insect-attacked female flower; 6, achene of the same: *Nos.* 3 *to* 6 *are from the same receptacle, and all are enlarged.*

SECTION II.—UROSTIGMA.

Urostigma.—*Male, fertile female, and gall flowers in the same receptacle; stamen* 1 *(stamens* 2 *in Nos.* 75 *and* 76*); stigma elongate, usually acute; receptacles in the axils of the leaves or of the scars of fallen leaves, tribracteate at the base (except in Kurzii, nervosa and pubinervis); leaves alternate, entire, coriaceous or sub-coriaceous, rarely membranous; usually trees or powerful climbers; epiphytal at least in early life.*

Series I.—Leaves coriaceous or sub-coriaceous, with short, or moderately long, stout petioles, which are never jointed to the blade.

SUB-SERIES 1.—*Leaves coriaceous, more or less ovate, with more or less cordate bases, pubescent when young (quite glabrous in* saxophila*).*

Receptacles shortly pedunculate.	
Receptacles obovoid	11. *F. Dalhousiæ.*
Receptacles sessile.	
Receptacles smooth when ripe.	
Receptacles globular.	
Leaves thinly coriaceous, glabrous when young	12. *F. saxophila.*
,, thickly coriaceous, pubescent when young	13. *F. Bengalensis.*
Receptacles oblong.	
Leaves broadly ovate	14. *F. Mysorensis.*
,, oblong elliptic, receptacles less than 1 in. long	15. *F. pilosa.*
,, narrowly obovate, receptacles 2 in. long	16. *F. cucurbitina.*
Receptacles tomentose when ripe.	
Receptacles less than ·5 in. diam., tomentum grey	17. *F. tomentosa.*
,, more than ·5 in. diam., tomentum rufous	18. *F. bracteata.*

SUB-SERIES 2.—*Leaves coriaceous, more or less ovate or elliptic, bases not cordate, glabrous at all times* (F. Forstenii *and* altissima *puberulous when young*).

Receptacles with long peduncles, leaves narrowly elliptic or lanceolate.	
Receptacles globular	19. *F. chrysolepis.*
,, ellipsoid, about 1 in. long	20. *F. pruniformis.*
,, conical, more than 1 in. long	21. *F. annulata*

Receptacles shortly pedunculate.	
Leaves broadly ovate	22. *F. Beddomei.*
„ elliptic, suddenly tapering at apex	23. *F. globosa.*
„ elliptic-lanceolate, gradually tapering towards the apex	24. *F. Travancorica.*
Receptacles sessile.	
Receptacles elongate, more than 1 in. long.	
Leaves ovate or elliptic; receptacles obovoid	25. *F. juglandiformis.*
„ oblong sub-obovate; receptacles cylindric	26. *F. xylophylla.*
Receptacles oblong, less than 1 in. long.	
Leaves oblong or ovate-oblong	27. *F. Forstenii.*
„ broadly elliptic or sub-obovate elliptic	28. *F. altissima.*
Receptacles globular, more or less depressed.	
Leaves ovate-elliptic, not elongate	29. *F. cycloneura.*
Leaves oblong, much elongate.	
Leaves very pale when dry, their margins revolute	30. *F. Lowei.*
„ not pale when dry, their margins not revolute	31. *F. pachyphylla.*

Sub-Series 3.—*Leaves coriaceous, tapering much towards both base and apex; basal bracts of receptacles large and prominent.*

Receptacles oblong	32. *F. Korthalsii.*
Receptacles globular.	
Receptacles flocculent-tomentose when young	33. *F. consociata.*
Receptacles glabrous, with large, prominent apical scales.	
Leaves 3 to 4 in. long	34. *F. involucrata.*
Leaves more than 4 in. long.	
Lateral primary nerves 3 to 4 pairs; petioles less than 1 in. long	35. *F. rigida.*
„ primary nerves 4 pairs and upwards; petioles more than 1 in. long	36. *F. procera.*
Receptacles depressed-globular, basal bracts united into a cup	37. *F. Hookeri.*

Sub-Series 4.—*Leaves coriaceous, tapering to base and apex; basal bracts of receptacles neither large nor prominent.*

Receptacles pedunculate.	
Receptacles less than ·5 in. in diam.	38. *F. glaberrima.*
„ 1 inch or more in diam.	39. *F. Rowelliana.*
Receptacles sessile.	
Apex of receptacle perforate and surrounded by an annulus	40. *F. microstoma.*
Apex of receptacle closed by scales.	
Receptacles globular or ellipsoid, more than ·2 in. in diam.	
Leaves conspicuously tuberculate when dry	41. *F. indica.*
„ not tuberculate	42. *F. Sumatrana.*
Receptacles globular, less than ·2 in. in diam.	
Stipules linear-lanceolate	43. *F. acamptophylla.*
„ ovate-acute	44. *F. Binnindykii.*

Sub Series 5.—*Leaves coriaceous, narrowly elliptic or oblanceolate, with broad blunt apices.*

Leaves cuneate, the nervation very prominent and oblique	45. *F. truncata.*
„ oblong, the venation nearly horizontal, not very prominent	46. *F. obtusifolia.*

SUB-SERIES 6.—*Leaves coriaceous, or sub-coriaceous, the primary and secondary nerves equally prominent, close together, straight, and anastomosing little except near the margin.*

Basal bracts of receptacles very large	47. *F. clusioides.*
Basal bracts of receptacles not large.	
Receptacles more than ·5 in. diam.	
Receptacles oblong	48. *F. garciniæfolia.*
Receptacles round.	
Leaves broadly ovate	49. *F. Benjamina* var. *comosa.*
,, ovate-oblong	50. *F. stricta.*
Receptacles less than ·5 in. diam.	
Stipules sub-persistent and very large	51. *F. elastica.*
Stipules small, not persistent.	
Lateral nerves of leaves about ·1 in. apart	52. *F. Trimeni.*
,, ,, much less than ·1 in. apart	49. *F. Benjamina.*

SUB SERIES 7.—*Leaves sub-coriaceous, ovate or elliptic, often sub-obovate or sub-oblanceolate; the secondary lateral nerves almost as prominent as the primary; the anastomoses numerous and minute, but distinct.*

Receptacles ·5 in. or more in diam.	
Stipules large, flaccid, sub-persistent	53. *F. dubia.*
Stipules small.	
Leaves ovate-elliptic	54. *F. Kurzii.*
,, narrowly elliptic or oblong	55. *F. rhododendrifolia.*
,, oblong-oval, suddenly narrowed into an acute apical tail	56. *F. caudiculata.*
Receptacles less than ·5 in. in diam.	
Receptacles glabrous.	
Leaves usually elliptic	57. *F. pisocarpa.*
,, obovate or oblanceolate or ovate-lanceolate	58. *F. glabella.*
,, ovate-rotund, obovate-rotund, or rhomboid-elliptic, the apex with rather an abrupt, short, blunt point	59 *F. retusa.*
,, ovate-elliptic, apex shortly caudate acuminate	60. *F. Talboti.*
,, broadly elliptic, sub-rotund	61. *F. callophylla.*
Receptacles tomentose	62. *F. Maclellandi.*

SUB-SERIES 8.—*Leaves coriaceous, elliptic, or oblanceolate; receptacles without basal bracts.*

Glabrous	63. *F. nervosa.*
Puberulous	64. *F. pubinervis.*

Series II.—Leaves sub-coriaceous or membranous, on long, slender petioles, which are sometimes jointed to the blade.

Apices of leaves more or less caudate-acuminate.	
Bases of leaves slightly narrowed to the petiole; apical cauda one-sixth as long as the blade	65. *F. Rumphii.*

Bases of leaves very seldom narrowed to the petiole; apical cauda one-third as long as the blade . . . . 66. *F. religiosa.*
„ of leaves never narrowed to the petiole; base usually deeply cordate 67. *F. Arnottiana.*
Apices of leaves not caudate-acuminate.
Receptacles on long peduncles . . . . 68. *F. Mooniana.*
„ sessile, in groups of about 4 from tubercles (shortened branchlets) 69. *F. tjakela.*
Receptacles sessile or shortly pedunculate, in pairs, axillary.
Receptacles tomentose . . . . 70. *F. insignis.*
Receptacles glabrous.
Stipules tomentose . . . . 71. *F. superba.*
Stipules pubescent or glabrous.
Leaves coriaceous, primary nerves indistinct, lamina never jointed to petiole; male perianth of 3 pieces . . . . 72. *F. tsiela.*
„ membranous, ovate, or ovate-oblong, primary nerves distinct, lamina indistinctly jointed to petiole; male perianth of 4 or 5 pieces . . . . 73. *F. infectoria.*
„ sub-coriaceous, broadly ovate to ovate-rotund, lamina distinctly jointed to petiole; male perianth gamophyllous . . . . 74. *F. geniculata.*

Series III.—Leaves coriaceous, stamens 2.

Receptacles 1 in. or more in diam., scabrid-pubescent . . . . 75. *F. callosa.*
Receptacles less than ·5 in. in diam., glabrous . . . . 76. *F. vasculosa.*

Series I.—Leaves coriaceous or sub-coriaceous, with short, or moderately long, stout petioles, which are never jointed to the blade.

Sub-series 1.—Leaves coriaceous, more or less ovate, with more or less cordate bases; pubescent when young (quite glabrous in saxophila).

11. Ficus dalhousiæ, *Miq. Lond. Journ. Bot.* vi. 571; *Miq. in Ann. Mus. Lugd. Bat.* iii. 285.

Young branches at first softly pubescent, afterwards smooth; leaves sub-coriaceous, petiolate, ovate-elliptic or broadly ovate, with acute apex, entire edges, and cordate 3- to 7-nerved base; lateral primary nerves, 10 to 12 pairs, rather prominent beneath, and, like the midrib and the rest of the lower surface, covered with minute soft whitish pubescence; upper surface minutely dotted, puberulous, or glabrous; length 4 to 9 in.; petioles pubescent, 1 to 2·5 in. long; stipules ovate-lanceolate, much acuminate, puberulous or glabrous, ·5 to 1 in. long; receptacles shortly pedunculate, in pairs, axillary, obovoid, with 3 broad triangular apical scales, which, with the 3 spreading broad triangular sometimes bifid basal bracts, are densely hairy, when ripe pubescent and about ·5 in. across; peduncles densely hairy, about ·3 in. long; male flowers very few, and only near apex of receptacle, sessile, globular, the perianth of 3 concave rounded pieces; stamen 1, the anther with wide connective, filament thick adnate; gall flowers on thick pedicels, the ovary obovoid, smooth, style short, perianth gamophyllous; fertile female flowers, sessile, the achene ovate, style long lateral, stigma cylindric.

Southern India, Nilgiri mountains, from 2,000 to 3,000 ft.,—*Wight, Gamble, King.*

An umbrageous tree, from 30 to 40 ft. high.

Miquel (in *Lond. Journ. Bot.* vi. 571) suggests that *F. ramentacea*, Roxb. must be near this. Roxburgh, however, describes (*Fl. Indica* iii. 547) his *ramentacea* as having very glossy, shortly petiolate leaves, and the branches as bearing rootlets; and his MSS. coloured figure in the library of the Botanic Garden, Calcutta (published by Wight as *Ic.* 657), confirms his description in these particulars. Roxburgh's figure is that of a flexuose twig, and suggests (notwithstanding Roxburgh's description of *F. ramentacea* as a small tree) that it is really an epiphytal climber, closely resembling, if not identical with, the species named *F. rigescens* by Miquel. I have never had Roxburgh's plant sent to me from Chittagong, where Roxburgh found it; but Kurz collected in Burmah a scandent epiphytal species which agrees excellently with Roxburgh's figure and (except as to habit) with his description of *ramentacea*, and this plant Kurz (in his *Forest Flora of Brit. Burm.* ii. 454) describes as *F. ramentacea*, Roxb. In the absence of a specimen named by Roxburgh himself, it would be unsafe to assert positively that his *ramentacea* is identical with *F. rigescens*, Miq.; but I think this is on the whole much more probable than Miquel's suggestion that it is near *F. Dalhousiæ*, Miq.

Plate 11.—Fruiting-branch of *Ficus Dalhousiæ*, Miq.; separate drawings of a receptacle seen from the side, of its basal bracts, and of stipules, *all of natural size;* and of the apex of a receptacle, *enlarged in size.*

Plate 81^{a}.—1, male flower unexpanded; 2 & 3, anthers; 4, gall flower; 5, fertile female flower enclosed in its perianth; 6, ripe achene: *all enlarged.*

12. F. SAXOPHILA, *Bl. Bijd.* 437; *Decaisne Nouv. Ann. Mus.* iii. 493; *Miq. in Ann. Mus. Lugd. Bat.* iii. 287; *Fl. Ind. Bat.* i. *pt.* 2. 333.

A glabrous tree: the leaves petiolate, thinly coriaceous, shining above, ovate-oblong, apex acute, edges entire, base sub-cordate or cordate, prominently 3-nerved, with 2 minute subsidiary nerves, lateral primary nerves about 5 pairs; length of blade 4·5 to 7 in.; petioles 1 in. to 1·75 in. long; stipules ovate-lanceolate, pubescent, about ·4 in. long; receptacles axillary, sessile, in pairs, depressed-globose, smooth, umbonate; basal bracts 3, small, broad, blunt; male flowers few, and only near the mouth of the receptacle, the perianth of 3 distinct pieces; stamen 1, the anther broadly ovate, filament short; gall flowers with elongated obovoid ovary and short sub-terminal style; fertile female flowers few, the achene ovoid, the style elongated, lateral, perianth (as in the gall flowers) of 5 lanceolate pieces.

Java,—*Blume.* Islands of Timor and Boeroe, in the Malay Archipelago.—*Teysmann.*

The leaves of this dry of a pale green colour. It is a very distinct species, but is ill represented in collections.

Plate 12.—Fruiting-branch of *F. saxophila*, Bl.; separate figure of base and apex of receptacle: *all of natural size.*

Plate 81^{b}.—1, male flower; 2, gall flower; 3, fertile female: *all enlarged.*

13. Ficus bengalensis, *Linn. Hort. Cliff.* 471. *n.* 4; *Spec. Plant. ed.* 2. ii. 1514; *Spec. Plant. ed. Willd.* iv. 1135; *Amoen. ed.* 3. i. 29. *n.* 10; *Commel. Hort. Amst.* i. 119. *t.* 62; *Beddome Fl. Sylv.* 222; *Brandis For. Flora* 412; *Kurz. For. Flora Brit. Burm.* ii. 440; *Miq. in Ann Mus. Lugd. Bat.* iii. 285.—*Urost. Bengalense*, Gasp. Ric. 82. t. viii. 14 to 21; Wight Ic. 1989; Miq. in Lond. Journ. Bot. vi. 572; Dalz. and Gibs. Bombay Flora 240.—*F. Indica*, Linn. Amoen., ed. 3. i. 27. n. 6 (excl. 7 and 8, and syn. *Katou alou*, Rheede); Roxb. Fl. Ind. iii. 539; Graham, Plants Bombay, 189. n. 1355; Hook. Journ. Bot. 1841, 284 to 292. t. 13, 14.—*F. Americana*, Pluk. Phyt. t. 178. fig. 1.—*Peralu*, Rheede Hort. Malab. i. t. 28; Ham. in Linn. Trans. xiii. 489.—*Vuta*, Asiat. Researches iv. 310; Wall. Cat. 4560 (in part).

A large spreading tree, with many aerial roots, the young parts softly pubescent; leaves coriaceous, petiolate, ovate, ovate-rotund to elliptic, with a blunt apex, entire edges, and rounded sub-cordate or slightly narrowed 3- to 7-nerved base; lateral primary nerves about 5 pairs, prominent; under surface glabrous or minutely pubescent, the reticulations distinct; upper surface glabrescent; length 4 to 8 in., breadth 2 to 5 in.; petioles ·5 to 2 in. long, stout; stipules ·75 to 1 in., coriaceous; receptacles sessile, in pairs, axillary, globular, puberulous, red, and about the size of a small cherry when ripe, with 3 broad, rounded, spreading, nearly glabrous, coriaceous basal bracts: male flowers rather numerous near the mouth of the receptacles, the perianth of 4 rather broad pieces; stamen 1; gall flowers with a similar perianth, the style short: fertile females with shorter perianth and elongated style.

An enormous tree, 70 to 100 ft. high, sending down roots from the branches, which enter the ground and form trunks, thus extending the growth of the tree indefinitely. Commonly planted in all parts of the plains of India; but really wild only in the sub-Himalayan forests and on the lower slopes of the hill ranges of Southern India. Known to Europeans as the banyan, and to natives of India under a variety of names.

In this species the tendency to send down aerial roots from the branches reaches its highest development. The great banyan of the Botanic Garden, Calcutta, now (1886) about a hundred years old, has 232 of these aerial roots, all reaching the ground and forming ancillary trunks from a few inches to 12 ft. in girth. The main or parent trunk of this remarkable tree girths 42 ft.; the circumference of its leafy crown is 857 ft. It is still growing vigorously, and, from its habit of sending down new roots every year, there is no reason why it should not go on increasing indefinitely, even after the central trunk shall have decayed. A still larger specimen exists at Mhasve, Taluka Jaoli, in the Satara zillah, in the Bombay presidency, for the measurements of which I am indebted to Mr. Lee Warner, of the Bombay Civil Service. Mr. Warner describes this tree and its exact situation as follows:—

> It grows under the hill fort of Wysatgarh, about three miles west of the main road between Poona and Kohlapur, and about twenty miles from Satara. It is the rendezvous in Meadows Taylor's novel of Tara. The circumference of the leafy head of the tree in A.D. 1882 is 1,587 ft.: its length from north to south is 595 ft. and from east to west 442 ft. The last two measurements show that the tree is not equally well grown all round, and as a fact it looks scraggy in places, as it has been left entirely without special protection.

The banyan is an object of veneration amongst Hindoos, and is much planted by them, especially near temples and shrines. No good Hindoo will fell a banyan, but branches are occasionally lopped even by high-caste Hindoos for various purposes. By the Mussalmans of

India the banyan is viewed rather with aversion than with respect. Like many other species of *Ficus*, the banyan usually begins its life as an epiphyte on another tree which it speedily strangles. Seedling banyans are also often found in the crevices of buildings, to which, unless uprooted, they prove very destructive. The great banyan in the Calcutta garden began its life as an epiphyte on a wild date-tree of which all trace has long disappeared.

The name *F. Bengalensis* was first published by Linnæus in the *Hortus Cliffortianus*, which appeared in 1737. The figures which Linnæus there quotes under his description, and the remark he makes about the aerial roots, prove that under this name he meant to describe the banyan. Unfortunately Linnæus also gave the name *F. Indica* to the banyan. In vol. i (p. 27) of the third edition of the *Amoenitates*, published in 1785, a list is given of three species of *Ficus* to which Linnæus gave the name of *F. Indica*. The third of these is probably American, and does not concern us. The second is identified with the *tjela* of Rheede (*Hort. Malab.* iii. t. 63), and is *F. tjela*, Roxb. From a note appended to the notice of the first of the three, it is quite clear that the banyan is meant. Under this first *F. Indica*, however, is quoted Rheede's figure of *Katou alou* (*Hort. Malab.* iii. t. 57), which is really a figure of the plant subsequently named *F. Mysorensis* by Heyne. There is also quoted under this first *F. Indica* Rumphius' *Varinga repens* (*Hort. Amb.* iii. t. 84), and to the plant which it is supposed Rumphius intended there to portray the name *F. Indica*, Linn. has by modern writers been arbitrarily confined. The name *F. Bengalensis*, Linn. is also given in the *Amoenitates* (l.c., p. 29), and under it is quoted Rheede's figure of the *Peralu* (*Hort. Malab.* i. t 28), which is unmistakeably a figure of the banyan. It is thus quite clear that under the authority of Linnæus the specific names *Bengalensis* and *Indica* were both given to the banyan, and, further, that Linnæus confused with the banyan the *Katou alou* of Rheede, which is *F. Mysorensis*, Heyne. The name *F. Bengalensis*, Linn. being the earliest which can without doubt be connected with the banyan, and with the banyan alone, must be retained for the present species.

Plate 13.—*F. Bengalensis*, Linn. Branch, with receptacles nearly ripe. The smaller figures show ripe receptacles, *all of natural size.*

Plate 81^{c}.—1, male flower; 2, gall flower; 3, fertile female flower: *all enlarged.*

14. Ficus mysorensis, *Heyne in Roth Nov. Spec. Pl.* 390; *Beddome Fl. Sylvat.* ii. 222; *Kurz For. Flora Brit. Burm.* ii. 440; *Miq. in Ann. Mus. Lugd. Bat.* iii. 285.—*Urost. Mysorense*, Miq. Lond. Journ. Bot. vi. 574.—*F. Indica*, Linn. Spec. Plant. ed. 2 (1763), ii. 1514; Amoenitates i. 27 n. 6 (partly).—*F. cotoniæfolia*, Vahl Enum. ii. 189 (excl. syn. Rumph.).—*F. citrifolia*, Willd. Spec. Pl. 1137.—*F. gonia*, Ham. Trans. Linn. Soc. xv. 137.—Wall. Cat. 4496 A, B, and C (not D).—*Katou Alou*, Rheede Hort. Malab. iii. t. 57.

A large umbrageous tree, with a few aerial roots, which embrace the stem; the young branches covered with rusty gray or rufous flocculent tomentum, afterwards nearly glabrous and dotted; leaves coriaceous, petiolate, ovate, ovate-elliptic, rarely obovate-elliptic, apex shortly and abruptly acuminate, edges entire, base rounded, emarginate, or cordate 3- to 5-nerved; lateral primary nerves, 10 to 13 pairs, prominent beneath, anastomosing submarginally; under surface at first flocculent-tomentose, ultimately nearly glabrous; upper surface glabrous and minutely dotted; length 3·5 to 8 inches; petioles stout, ·75 to 1·3 in. long; stipules from ·25 to ·5 in., broadly triangular, flocculent-tomentose on the lower surface; receptacles sessile, in pairs, axillary, oblong to sub-obovate, truncate, or slightly depressed at the apex, when young flocculent-tomentose, when ripe nearly glabrous, 1 in. long and orange red; basal bracts 3, broadly triangular, blunt, spreading; male flowers near apex of receptacle, rather numerous, pedicillate; stamen 1, the anther cells sub-globular, perianth of 4 pieces; gall flowers broad, smooth, with short sub-terminal style; fertile females with ovoid achene and elongate lateral style. As in *F. Bengalensis*, Linn. and several other species, the young receptacles are enclosed in calyptriform involucres.

VAR. 1. PUBESCENS.—*F. pubescens*, Roth Nov. Spec. Pl. 387.—*F. rupestris*, Ham. (non Bl.) in Linn. Trans. xv. 137.—*Urost. dasycarpum*, Miq. in Lond. Journ. Bot. vi. 574; Dalz. and Gibs. Fl. Bomb. 242.—*F. tomentosa*, Herb. Madras, Wall. Cat. 4499; Wight (Kew Dist.) 2753.

Leaves smaller than in typical form, with proportionately fewer lateral primary nerves and often with repand edges; tomentum denser, longer, more copious and of a deep ferruginous red colour, especially on the very young parts.

The above two forms occur in peninsular India and Ceylon, ascending to elevations of about 2,500 ft.

VAR. 2. SUB-REPANDA.—*F. sub-repanda*, Wall. Cat. 4568A, not B.—*F. lateritia*, Wall. Cat. 4496D (*sub Mysorensis*).

Leaves larger than in type, often narrowed, 7- to 9-nerved at the base, primary lateral nerves 12 to 20 pairs, when adult quite glabrous, sub-scabrid, and dotted; receptacles sessile, ovoid when young, globular, smooth, orange red and about 1·5 in. across when ripe.

This form is not found in Southern India, but it replaces the other two at the base of the Eastern Himalaya, in the Khasi Hills, and in the Burmese hill ranges at elevations of from 1,000 to 2,000 ft. It grows to be a very large tree.

In my remarks on the synonymy of *F. Bengalensis*, Linn. I have explained that Rheede's figure of this plant was cited by Linnæus under his description of the true banyan. As regards the older synonyms of this species, I have no doubt that *F. pubescens*, Roth, and *F. Mysorensis*, Heyne, although kept distinct by Roth, are, as is evident from Roth's own descriptions, one and the same. There is a specimen at Kew from Rottler's Herbarium bearing two labels in (I presume) Heyne's handwriting. Both are dated 1808. One bears the name '*F. Mysorensis nobis*,' and on the other are written the words '*Ficus sp. n.?*' The specimen pasted down on the sheet with these two labels consists of three separate leaves, a fragmentary fruiting-twig, and some loose receptacles, all belonging to *F. Dalhousiæ*, Miq., a plant which agrees with neither of Roth's descriptions just quoted. There must therefore have been some mixing up of material. As to the validity of the reduction of *F. rupestris*, Ham. to the present species, I feel pretty confident. Hamilton (l. c.) says that *F. tomentosa*, Roxb. is either the same as *F. asinina*, Ham., a species which he (Ham.) found in Behar, or the same as *F. rupestris*, Ham., a species from Mysore. Now specimens of *F. asinina*, Ham. named by the author's own hand show it to be true *F. tomentosa*, Roxb., a species found both in Behar and Mysore, whereas *rupestris* is according to Hamilton a Mysore plant; and the species to which I reduce it, viz. *F. Mysorensis*, is found in Mysore, but not in Behar. There is confusion in the Wallichian material which falls into this species and which was distributed as *Mysorensis*, *tomentosa* and *repanda*.

Wall. Cat. Nos. 4496A, B, and C, distributed as *Mysorensis*, Herb. Madras, are typical *Mysorensis*, Heyne.

No. 4496D is *F Mysorensis*, Heyne, var. *repanda*.

„ 4499 distributed as *F. tomentosa*, Herb. Madras, is *F. Mysorensis*, Heyne, var. *pubescens*.

„ 4568A is *F. Mysorensis*, Heyne, var. *repanda*.

„ 4568B is a small twig of something totally different, which I have not been able to identify, but which resembles one of the forms of *F. infectoria*, Willd.

PLATE 14.—*F. Mysorensis*, Heyne. Fruiting-branch of the typical form, with separate figures of the apex of a twig with two stipules detached; of a receptacle seen from above; of the basal bracts of a receptacle: *all of natural size.*

PLATE 15.—Fruiting-branch of *F. Mysorensis*, Heyne, var. *sub-repanda*, with separate figure of base and apex and vertical section of a receptacle: *all of natural size.*

PLATE 81^{d}.—1, male flower; 2, gall flower; 3, fertile female: *all enlarged.*

15. FICUS PILOSA, *Reinw. in Bl. Bijd.* 446; *Miq.* (*sub Urost.*) *Zoll. Syst. Verz.* 90, 96; *Fl. Ind. Bat.* i. *pt.* 2. 351; *Benth. Fl. Austral.* vi. 164.—*Urost. bicorne*, Miq. Pl. Jungh. 47; Miq. Fl. Ind. Bat. i. pt. 2. 350, pt. 24A.—*Urost. sub-cuspidatum*, Miq. Zoll. Syst. Verz. 97.

A large tree, with a few aerial roots; young parts covered with short flocculent (usually gray) tomentum which is speedily deciduous; leaves sub-coriaceous, elliptic-oblong to obovate-elliptic, narrowed, rounded, or truncate, often sub-cordate, and occasionally slightly unequal at the base; apex with a short, abrupt, blunt apiculus; edges entire, slightly undulate; length of blade 3·5 in.; nerves about 8 to 11 pairs, curving and anastomosing near margin; petioles ·5 to ·8 in.; stipules ·4 to ·6 in. long, membranous, rufous, tomentose when young; receptacles axillary, sessile, in pairs, ovoid-cylindrical, umbonate, ·75 in. long, reddish and glabrous when ripe, with 3 minute rounded membranous ciliate bracts at their bases; male flowers on short thick pedicels, the perianth of 4 hyaline pieces; anther 1, the filament stout, short; gall flowers with gamophyllous 3- to 4-toothed, oblique, closely-embracing perianth, style elongate, stigma flattened, ovary smooth; fertile female flowers very like the galls, but the perianth less distinct and the achene broader and tuberculate.

VAR. CHRYSOCOMA.—*F. chrysocoma*, Bl. Bijd. 443.—*Urost. chrysothrix*, Miq.; Zoll. Syst. Verz. 90, 96.

Tomentum more copious than in type, and of a bright rufous colour.

Penang, Java, Borneo, and probably in other parts of the Malayan Archipelago; N. Australia.

This species comes very near *F. Mysorensis*, Heyne, and I greatly doubt whether it should be kept separate. My own opinion is that further observation in the field will prove this and *Mysorensis* to be but forms of one plant.

The variety *chrysocoma* runs exactly parallel to the variety *pubescens* of *F. Mysorensis*. None of the Indo-Malayan specimens of this in the Herbaria of Kew, Brit. Museum, Leiden, Utrecht, or Calcutta, have good fruit. I am therefore obliged to describe the receptacles from a specimen from Queensland.

PLATE 16.—Twig of *F. pilosa*, Reinw. with ripe receptacles: *of natural size.*

PLATE 81^{e}.—1, unexpanded male flower; 2, male flower opened out; 3, gall flower; 4, fertile female flower: *all enlarged.*

16. FICUS CUCURBITINA, *nov. spec.*

A tree? The young shoots verrucose, with rather prominent rings, and covered with deciduous long hispid yellow hairs, ultimately glabrous; leaves coriaceous, obovate-elliptic, the apex suddenly and shortly cuspidate, edges entire, base narrowed, rounded, obscurely 3- to 5-nerved; primary lateral nerves 8 pairs, and, like the midrib, pale, prominent and minutely puberulous on the lower surface, the rest of the lower surface glabrous, the reticulations distinct; upper surface glabrous, except the midrib and primary nerves, which are minutely puberulous; length of blade 5 to 7·5 in., petiole ·8 in.; stipules lanceolate, deciduous, hispid, about 1 in. long; receptacles large, sessile, axillary, in pairs, obovoid-cylindric, the apex prominently umbonate; the umbilicus triangular, imperfectly closed by 3 scales; hispid pilose when young, glabrous when ripe; basal bracts none, but a slight annular swelling at the point of insertion on the stem; length 2 in., breadth 1 in.

Borneo,—*Sig. Beccari* (Herb. Becc. P. B. n. 3436); Celebes,—*Beccari.*

The leaves of this resemble those of *pilosa*, Reinw. and *Mysorensis*, Heyne, but its receptacles are like those of *F. xylophylla*, Wall. It is a remarkably fine and very distinct species.

PLATE 17.—*F. cucurbitina*, King. A branch with receptacles nearly mature. 1, stipules—*of natural size.*

17. FICUS TOMENTOSA, *Roxb.; Willd. Spec. Plant.* iv. 1136; *Roxb. Hort. Bengalensis*; *Roxb. Fl. Ind.* iii. 550; *Wight Ic.* 647; *Brandis For. Flora* 414; *Miq. in Ann. Mus. Lugd. Bat.* iii. 285.—*Urost. tomentosum, obversum and connivens*, Miq. in Lond. Journ. Bot. vi. 573.—*F. mollis*, Vahl Symb. (1790), i. 82, and Enum. Pl. ii. 192 (excl. syn. Willd.).—*F. asinina*, Ham. in Linn. Trans. xv. 138; Wall. Cat. 4497A, B, C, D.

A large umbrageous tree, throwing out small aerial roots from the branches; the young shoots, petioles, under surfaces of the leaves and receptacles covered with rusty gray tomentum; leaves crowded towards the ends of the branches, coriaceous, petiolate, ovate-elliptic or obovate-elliptic, bluntly apiculate, with entire edges and rounded or slightly cordate 5- to 7-nerved base; primary lateral nerves about 5 pairs, prominent; upper surface glabrous or glabrescent, minutely dotted when dry; length 2 to 5 in.; petioles ·75 to 1 in.; stipules about ·3 to ·5 in., densely woolly outside, with broad, scarious, glabrous edges; receptacles sessile, in pairs, axillary, pisiform, tomentose, from ·25 in. to ·4 in. across, apical scales small, glabrous, basal bracts 3, large, spreading, pubescent, sometimes 3-fid when young; male flowers few, near the mouth of the receptacle, the perianth of 4 lanceolate pieces; stamen 1; gall and fertile female flowers with perianth shorter than the ovary, of 4 pieces; gall flower with smooth ovary and short style; fertile female with tuberculate achene and elongate style.

Widely distributed in the drier parts of the Gangetic plain and of Central and Southern India; also in Ceylon.

The synonymy of this species is rather involved, and I shall therefore here attempt to disentangle it. The oldest name for this species is undoubtedly that of Vahl, who, in his *Symbol. Bot.* (published in 1790), named it *mollis*. Willdenow however, in his observations on the genus *Ficus* (*Act. Acad. Berol.* 1801, 91. t. 5), described and figured as *F. mollis*, Vahl, a plant about the identity of which with Vahl's *F. mollis* he was himself doubtful, and which his figure unmistakeably shows to be *F. oppositifolia*, Roxb. (= *F. hispida*, Linn. fil.).

In his edition of *Linn. Sp. Plant.* iv. 1136, Willdenow, having apparently discovered his mistake, accepts for this species Roxburgh's then unpublished name (Roxburgh's Fl. Ind. was published as regards *Ficus* in 1832) *tomentosa*, and reduces to *tomentosa*, Roxb. *F. mollis*, Vahl Symb. Miquel (*Lond. Journ. Bot.* vi. 573) considers *F. pubescens*, Roth (*Nov. Pl. Spec. Ind. Or.* 387), to be the same as this species: but Roth's description appears to me to fit *F. Mysorensis*, Heyne, much better, especially as to the receptacles, which Roth says are red, of the size of a cherry, with an obsolete 5-partite, green, pubescent calyx. Roth, however, at p. 390 of the same book also describes *F. Mysorensis*, Heyne, and one is thus obliged to believe that he described the same plant under two names.

The species described as *F. asinina* by Buch. Ham. in *Linn. Trans.* xv. 138, and the specimens so named by his own hand (and which were issued by Wallich as No. 4497A of his Catalogue) are true *F. tomentosa*, Roxb. Hamilton's specific name, as he himself tells us, was given from the fact that the tree is called by the natives of Behar 'Guddha-ke-Bhar,' or Donkey's Banyan—a name which up to the present time is the current vernacular for *F. tomentosa*, Roxb.

Urost. obversum and *Urost. connivens*, Miq. are, as I have satisfied myself by examination of the type specimens in the Herbarium at Utrecht, only forms of *F. tomentosa*, Roxb.

F. glumosa, Cail. Delile, an African plant, differs from the present species only in having shortly pedunculate receptacles furnished with a few strigose hairs, and in having smaller basal bracts.

PLATE 18.—Branch of *F. tomentosa*, Roxb. with ripe receptacles. 1, young receptacle showing apex; 2, base of the same, showing the slightly trifid basal bracts: *all of natural size.* (These fruits are not very well drawn.)

PLATE 81^{F}.—3, male flower; 4, gall flower; 5, fertile female: *all enlarged.*

18. FICUS BRACTEATA, *Wall. Cat.* 4498; *Miq. in Lond. Journ. Bot.* vi. 576; *Ann. Mus. Lugd. Bat.* iii. 285.

A powerful scandent epiphyte; the young branches, lower surfaces of leaves and of stipules, the petioles, and the receptacles, densely covered with deciduous reddish-brown flocculent tomentum; leaves coriaceous, petiolate, obovate-oblong, with an abrupt, short, blunt apiculus, entire edges, and cordate, slightly unequal, truncate, 5-nerved base; lateral primary nerves 4 to 6 pairs, prominent beneath; upper surface smooth, except the midrib, which is persistently rusty-tomentose; lower surface becoming in adult leaves pubescent or sub-glabrous; length 7 to 11 in.; petioles ·7 to 1·75 in.; stipules flaccid, ovate-acuminate, 2 in. by 1 in., densely tomentose on the midrib outside; receptacles sessile, crowded at the apices of the branches in the axils of the undeveloped leaves, globular or turbinate, slightly trigonous, densely tomentose even when ripe, bright orange, ·6 in. across; basal bracts 3 or 4, broad, rounded, scarious, glabrous; male flowers scattered over all parts of receptacle, pedicillate, the perianth of 2 or 3 hyaline pieces; anther 1, the filament very short; gall flowers with gamophyllous, 3-toothed perianth closely enveloping the smooth ovoid ovary; fertile female flower with loosely attached perianth of 4 lanceolate pieces, the achene elongate, often sessile; the interior of the receptacle with numerous lanceolate scales.

Penang, Singapore,—*Wallich, King*; Java,—*Forbes*.

The enormous long-persistent prefoliar stipules (really leaf-scales) borne on the apices of the branches and surrounding the densely tomentose young fruit at once distinguish this from any other species of the section *Urostigma*.

Plate 19.—Fruiting-branch of *F. bracteata*, Wall. 1, stipules; 2, base of receptacle; 3, apex of receptacle showing basal bracts: *all of natural size.*

Plate 81^{h}.—1, male flower; 2, gall flower; 3, fertile female flower: *all enlarged.*

Sub-series 2.—Leaves coriaceous, more or less ovate or elliptic, bases not cordate, glabrous at all times (F. Forstenii *and* altissima *are puberulous when young).*

19. Ficus chrysolepis, *Miq. in Ann. Mus. Lugd. Bat.* iii. 215, 286.

A tree; all the adult parts glabrous except the stipules and basal bracts of the receptacles; leaves coriaceous, lanceolate-oblong, apex shortly acuminate, edges entire, base narrowed, 3-nerved; lateral primary 10 to 13 pairs, rather prominent beneath; length of blade about 7 in.; petioles 1·25 in. long, stout; stipules small, membranous, densely covered with long yellowish hairs, about ·6 in. long; receptacles long-pedunculate, axillary, solitary, or in pairs, ovoid-globose when immature, globose when mature, 1·5 in. long by 1·25 in. broad; the apex partially closed by 3 large scales, through the interspace between the apices of which the smaller more internal scales protrude; bracts of the base of the receptacle 3, minute, spreading, triangular, yellowish, hirsute externally, rising from the peduncle a little below the base of the receptacle; peduncle stout, ·7 in. long, with a few yellow hairs at the base; male flowers very numerous over whole surface of interior of receptacle, on long pedicels, the anther single, sessile, perianth of 2 or 3 pieces; gall flowers on long pedicels, the perianth of 4 or 5 pieces, the ovaries smooth, much smaller than those of the fertile female flowers, which are sessile with tuberculate achenes.

Celebes,—*Teysmann.*

Apparently a large tree. The fruit is nearly that of *pruniformis*, but the leaves and stipules are very different. It also resembles *F. annulata*, Bl., but the peduncular annulus just under the basal bracts of the receptacle, and which is so characteristic of *F. annulata*, is absent in this.

Plate 20.—Branch of *F. chrysolepis*, Miq. with ripe receptacles. Separate drawings of apex of receptacle and of unripe receptacle seen from the side.

Plate 81^{i}.—1, male flower; 2, gall flower; 3, fertile female flower; 4, achene of fertile female: *all enlarged.*

20. Ficus pruniformis, *Bl. Bijd.* 451; *Miq. in Ann. Mus. Lugd. Bat.* iii. 266, 286 (*sub Urost.*); *Zoll. Syst. Verz.* 91, 97; *Fl. Ind. Bat.* i. *pt.* 2, 352; *Supp.* 177, 440?—*F. depressa*, Bl. Bijd. 450; Miq. Ann. Mus. Lugd. Bat. iii. 286; Miq. (*sub Urost.*) Fl. Ind. Bat. i. pt. 2. 351 (*non Urost. depressum*, Miq. in Zoll. Syst. Verz. 90, and Lond. Journ. Bot. vi. 576, which = *F. annulata*, Bl.).—*Urost. peracutum*, Miq. Fl. Ind. Bat. i. pt. 2. 343.

A powerful stem-clasping epiphyte or large tree; all parts except the stipules glabrous, leaves coriaceous, long-petiolate, lanceolate, or ovate-lanceolate, apex acuminate, edges entire, base much narrowed, rarely rounded, 3-nerved; lateral primary nerves, 6 to 10 pairs, prominent beneath; length of blade 4 to 6 in.; petiole slender, ·8 to 1·3 in. long; stipules linear lanceolate, ·6 to ·8 in. long, pubescent outside; receptacles long-pedunculate, axillary, solitary, or in pairs, ovoid, slightly umbonate and reddish when ripe, about 1 in. long, apical scales small, coriaceous; basal bracts 3, small, coriaceous, free, ovate, acute, puberulous, sometimes attached to the peduncle a little below the base of the receptacle; peduncle ·5 to ·8 in. long, slender; male flowers very numerous over all parts of the interior of the receptacle, pedicillate, the perianth of 2 broad concave hyaline pieces; stamen 1, elongate-ovate, sessile; gall flowers pedicillate, the perianth gamophyllous, 5-cleft, ovary smooth, style short, stigma obliquely truncate; fertile female flowers, mostly sessile, the achene ovoid, tuberculate, style long, lateral, stigma flat, elongate.

Java, Sumatra, Perak (Malayan peninsula) at from 1,000 to 4,000 ft.

Readily recognised by its large long-pedunculate receptacles.

I have not seen *F. peracutum*, Miq., but I reduce it here on Miquel's own authority. *F. depressa*, Bl. is manifestly the same as his *pruniformis*, although he described them as different on consecutive pages of his *Bijdragen*.

The plant of Zollinger's collecting (*Herb. Zoll.* 571), which Miquel named and described as *F. depressa*, is not *depressa*, Bl. but *F. annulata*, Bl., as I have satisfied myself by inspection of Zoll.'s specimen.

Plate 21.—Fruiting-branch of *F. pruniformis*, Bl. 1, apex of receptacle; 2, base of receptacle; 3, stipules: *all of natural size.*

Plate 81^{k}.—1, male flower, the perianth being removed; 2, male flower, the anther being removed; 3, gall flower; 4, fertile female achene: *all enlarged.*

21. Ficus annulata, *Bl. Bijd.* 448; *Miq. in Ann. Mus. Lugd. Bat.* iii. 285; *Kurz For. Flora Brit. Burm.* ii. 443.—*Urost. annulatum*, Miq. in Zoll. Syst. Verz. 90; Fl. Ind. Bat. i. pt. 2. 352; Supp. i. 440.—*F. flavescens*, Bl. Bijdr. 449.—*Urost. flavescens*, Miq. in Plantæ Jungh. 48; Fl. Ind. Bat. i. pt. 2. 335; Supp. i. 436.—*Urost. biverrucellum*, Miq. Fl. Ind. Bat. Supp. i. 436.—*F. valida*, Bl. Bijd. 449.—*Urost. validum*, Miq. Fl. Ind. Bat. i. pt. 2. 337.—*Urost. depressum*, Miq. in Lond. Journ. Bot. vi. 576; Zoll. Syst. Verz. (excl. syn. *F. depressa*, Bl.).—*Urost. conocarpum*, Miq. Fl. Ind. Bat. i. pt. 2. 350.

A large stem-clasping, semi-scandent epiphyte, rarely an independent tree; all the parts glabrous or (var. *valida*) the under surfaces of the leaves and stipules and the pedicels more or less pubescent; leaves thinly coriaceous, oblong or oblanceolate or ovato-elliptic with shortly acuminate apex, entire, slightly undulate edges, acute, or slightly rounded, never cordate, 3-nerved base; lateral primary nerves, 10 to 15 pairs, prominent, with curving submarginal anastomoses, reticulations conspicuous; length 6 to 12 in.: petioles 1 to 1·5 in. long; stipules linear-oblong, flaccid, fugacious, 1·5 in. to 6 in. long; receptacles pedunculate, in pairs, axillary, ovoid or oblong, prominently umbonate, smooth: when ripe 1 to 1·5 in. long, greenish orange-yellow, with white spots; basal bracts 3, ovate, acute, free; peduncles stout, ·5 in. to ·7 in. long, with a thickened annulus near their apices and below the basal bracts of the receptacle; male flowers scattered all over the interior of the receptacle, numerous, pedicillate; gall flowers numerous, the perianth gamophyllous, 3-toothed, achene ovoid, smooth, style long, with long flattened stigma; fertile female flowers very few, the perianth deeply 4-cleft, achene tubercular, style shorter than achene, stigma clavate.

On the plains and on the lower slopes of mountain ranges in Burmah, the Malayan peninsula and islands. Common.

This is a widely distributed species, and therefore assumes several forms. The commonest of these is that with broadly-based glabrous leaves, which Blume (from the curious annulus near the apex of the receptacular pedicel) called *annulata*. The mountain form, with the bases of the leaves narrowed, he called *F. flavescens*, and to this Miquel added the synonym *F. biverrucellum*, which he himself afterwards reduced. The form, with leaves slightly hairy below, sericeous stipules and short tomentose pedicels, Blume called *valida*; and on the specimens of this form from various parts of the Malayan Archipelago, Miquel at different times founded his two species *Urostigma depressum* and *conocarpum*. I have examined the types of all these at Leiden and Utrecht, and I find the differences between them and typical *F. annulata*, Bl. so slight that it is only in deference to the authority of Blume that I keep as varieties the two most divergent of these, viz. *flavescens* and *valida*. The curious annulus on the pedicel is common to all the forms.

VAR. 1. FLAVESCENS (species Bl.) *F. biverrucellum*, Miq. Bases of leaves much narrowed.

This form, which occurs chiefly in Burmah, received specific rank from Blume and Miquel. In Java and the other Malayan islands it is confined to mountain slopes about 5,000 ft. above the sea. In the neighbourhood of Calcutta and about other stations in Lower Bengal it is in cultivation under the name of *F. magnifolia*.

VAR. 2. VALIDA (species Bl.). Leaves puberulous below, especially on the nerves; stipules adpressed-sericeous beneath; pedicels only ·25 in. long, very thick, deciduously tomentose.

PLATE 22.—Twig of *F. annulata*, with an almost mature receptacle. Separate drawings of one of the largest stipules, and views of apex and base of a receptacle: *all of natural size.*

PLATE 23.—Twig of *F. annulata*, var. *valida*, with two nearly ripe receptacles. Separate drawings to show base, apex, and sides of receptacles, and two stipules of the smaller size.

PLATE 81^1.—1, male flower; 2 stamen, the perianth being removed; 3, gall flower; 4, fertile female flower: *enlarged.*

22. FICUS BEDDOMEI, *nov. spec.*

A tree? All parts glabrous, young branches thick, with pale bark; leaves coriaceous, long-petiolate, ovate-rotund or broadly ovate, shortly acuminate, edges entire, slightly undulate, base broad, truncate, or very slightly emarginate, 3-nerved; lateral primary nerves nearly at right angles to the midrib, about 12 pairs, prominent on both surfaces; length of blade about 7 in., breadth at broadest part rather more than 4 in.; petioles stout, about 2·5 in. long; stipules lanceolate, about ·5 in. long; receptacles pedunculate, axillary, in pairs, ovoid or slightly obovoid, with a rather prominent apical umbilicus and several vertical ridges, smooth, 1 in. long, and about ·75 in. across, basal bracts 3, small, broadly triangular, coriaceous, united by their bases; peduncles stout, ·75 in. long; male flowers, numerous, scattered, shortly pedicillate, the anther broad, single, sessile, the perianth of 2 or 3 pieces; gall and fertile female flowers shortly pedicillate, the perianth of 4 or 5 lanceolate pieces (ripe achenes unknown); the whole of the interior of the receptacle covered between the insertions of the flowers with long, narrow, pointed scales.

S. India, Tinnivelly Hills,—*Col. R. H. Beddome.*

A very remarkable species, of which I have seen only three specimens, all collected by Col. Beddome.

Plate 24.—Fruiting-branch of *F. Beddomei*, King. Separate figures of receptacles, basal bracts, and stipules: *all of natural size.*

Plate 81^{m}.—1, male flower, the anther removed; 2, the same, the perianth removed; 3, female flower: *all enlarged.*

23. Ficus globosa, *Bl. Bijd.* 449; *Miq. in Ann. Mus. Lugd. Bat.* iii. 285.—*Urost. globosum*, Miq. Fl. Ind. Bat. i. pt. 2. 335.—*Urost. Manok*, Miq. in Zoll. Syst. Verz. 90, 96; Miq. Fl. Ind. Bat. i pt. 2. 337.—*F. onusta*, Wall. Cat. 4563; Kurz For. Flora Brit. Burm. ii. 441.—*Urost. onustum*, Miq. in Lond. Journ. Bot. vi. 575; Miq. Fl. Ind. Bat. i. pt. 2. 336.—*F. firma*, Wall. Cat. 4564A and B.

A large climber, the younger branches covered with deciduous brown scurf, with which are mixed a few hairs, ultimately all parts glabrous; leaves thinly coriaceous, petiolate, elliptic, or oblong (obovate-elliptic in var. *manok*), apex suddenly shortly cuspidate, edges entire; base broad, rounded, slightly emarginate (narrowed in var. *manok*), 3-nerved; lateral primary nerves, 6 to 9 pairs, nearly at right angles to the midrib, rather prominent below; length 3·5 to 6·5 in.; petioles ·5 to 1·5 in. long; stipules deciduous, linear, acute, from ·75 to 2·5 in. long; receptacles shortly pedunculate, in pairs, axillary, subglobular and umbonate when young, when ripe depressed at the apex, almost turbinate; ·6 in. to 1 in. across, minutely scurfy, basal bracts 3, small; peduncles stout, ·2 in. long; male flowers, few, scattered, pedicillate, the anther single, sessile, perianth hyaline, of 4 pieces; gall flowers mostly pedicillate, the perianth gamophyllous, 5-cleft, ovary smooth, style short, lateral; fertile female flowers few, sessile, or nearly so, perianth gamophyllous, with 5 lanceolate teeth, style elongate, stigma obovate, achene ovoid, tuberculate.

Var. Manok (species Miq.). Bases of leaves narrowed; petioles 1·3 to 2 in. long.

The typical form occurs in South Burmah and in the Malayan peninsula and Archipelago. The variety *manok* has been collected in Java by Zollinger, in Sumatra by Forbes, and in Perak by Kunstler.

In the Leiden Herbarium several specimens of this species from Sumatra are named *F. annulata*, Bl. var. *Runnut*, Miq., but the name does not appear to have been published. The plants issued by Wallich as *F. onusta* and *firma* were collected in Burmah and Penang. Wallich distributed no plant under the name of *F. globosa*, Bl., but I can see nothing to distinguish the types of these two species of his from *F. globosa*, Bl. Miquel maintains *F. onusta*, Wall. as a species, but he does not in his *Enumeratio Fic. Geront. Spec.* account for *F. firma*, Wall. Kurz also keeps up *F. onusta*, Wall. as a species; but except that he describes *onusta* as a tree (*globosa*, Bl. being a climber) and the receptacles as umbonate, his description suits *globosa*, Bl. admirably. Powerful, epiphytal, semiscandent species of *Ficus*, however, often become trees themselves by destroying the trees that originally gave them support; and in the absence of any other difference I do not see why *onusta* should be kept up as a species. Kurz's description of the fruit as umbonate applies to the young receptacles.

On the Kew sheet of *F. onusta*, Wall. Cat. 4563, there is a mixture of the leaves and receptacles of *F. microstoma*, Wall.

Some remarks on the synonymy of the var. *manok* will be found under the description of *microstoma*.

PLATE 25.—*F. globosa*, Bl. The upper twig is of typical *F. globosa*; the lower is of the variety *manok*. The smaller figures show receptacles and a stipule, *all of natural size.*

PLATE 81^n.—1, male flower; 2, gall flower; 3, fertile female flower : *enlarged.*

24. FICUS TRAVANCORICA, *nov. spec.*

A straggling shrub, the young parts minutely pubescent, but ultimately all parts glabrous, bark of young shoots pale; leaves coriaceous, lanceolate, the apex acuminate, margins entire, sub-undulate, base much narrowed, 3-nerved; lateral primary nerves 10 to 12 pairs, distinct but not thick, reticulations minute but distinct; length of blade 5 to 6 in., of petioles ·5 to ·6 in.; stipules linear-lanceolate, about 1 in. long; receptacles axillary, in pairs, pedunculate, globose, smooth when ripe and about ·4 in. across, apical scales broad, flat; basal bracts 3, broadly triangular, with blunt apices; peduncles ·25 in. long; male flowers scattered, sessile, the perianth of 4 or 5 pieces; anther 1, with a short filament; gall and fertile female flowers nearly sessile, the perianth of both of 4 or 5 pieces; the ovary of the gall elongate-ovate, and the style short; achene of fertile female ovate, with a long style and bifid stigma.

Hills of North Travancore, on the west coast of India, at an elevation of 3,500 ft.,—*Col. R. H. Beddome.*

The single specimen of this at Kew is the only one I have seen. This approaches *F. Beddomei*, but has differently shaped leaves and much smaller receptacles.

PLATE 26.—*F. Travancorica*, King. Fruiting-branch, *of natural size.* 1 & 2, receptacles seen from the side and base, *both enlarged.*

PLATE 82^o.—1, male flower; 2, gall flower; 3, fertile female: *all enlarged.*

25. FICUS JUGLANDIFORMIS, *nov. spec.*

A tree? glabrous in all its parts; leaves petiolate, thickly coriaceous, broadly elliptic to ovate-elliptic, apex with short, abrupt, blunt apiculus; edges entire, recurved, slightly undulate, cartilaginous; base rounded or slightly narrowed, with 2 prominent, slightly supra-basal and 2 obscure basal nerves; lateral primary nerves, 7 to 8 pairs, prominent, reticulations conspicuous and rather wide; upper surface with numerous minute black dots; stipules ovate-acuminate, about 1·5 in. long, glabrous; petioles stout, ·8 in. to 1·25 in. long; receptacles sessile, axillary, in pairs, obovate, umbonate, smooth, 1·4 in. long by 1 in. broad; apical scales thin, broad, shining; basal bracts 3, broadly ovate, obtuse, cartilaginous, ·4 in. long.

Mount Singalan, in Sumatra,—*Beccari*, P. S. 212.

This species comes very near *F. Forstenii*, Miq. as to leaves, but is glabrous everywhere, and has larger receptacles, which are obovate.

PLATE 27.—Twig of *F. juglandiformis*, King, with mature receptacles. 1, stipules; 2, basal bracts of receptacle: *all of natural size.*

26. FICUS XYLOPHYLLA, *Wall. Cat.* 4558; *Miq. Ann. Mus Lugd. Bat.* iii. 286.—*Urost. xylophyllum*, Miq. Lond. Journ. Bot. vi. p. 577; Fl. Ind. Bat. i. pt. 2. 352. t. 23.

A powerful epiphyte or independent small tree; young branches thick, pale scurfy when very young; other parts quite glabrous, except the stipules and receptacular bracts; leaves large, very coriaceous, broadly elliptic or oblong to obovate-elliptic, narrowed to the base, apex broad, rounded, obtuse, edges entire, revolute when dry, base strongly 3-nerved; lateral primary nerves about 5 pairs, prominent below, reticulations inconspicuous; length of blade 6 to 10 in., breadth 3 to 4·5 in.; petioles stout, 1 to 1·3 in. long; stipules coriaceous, broadly ovate-acute, with short reddish pubescence externally, occasionally with broad smooth margins, 1·3 in. long; receptacles axillary, in pairs, or solitary by abortion, sessile, cylindro-conical, truncate at the base, apex umbonate, when ripe smooth bright red with faint white spots; 1·5 to 2 in. long, 1 in. broad at base; basal bracts 3, spreading, broadly triangular, pubescent; male flowers numerous, scattered over the whole interior of the receptacle, pedicillate, the perianth of 4 pieces; anther 1, elongate, sessile; gall flowers sub-sessile or pedicillate, the perianth of 5 pieces, ovary smooth, style elongate; fertile female flowers sessile, the achene minutely tuberculate, the perianth degenerate into soft cellular tissue.

Singapore, Perak, Sumatra. A very distinct species.

PLATE 28.—Fruiting-branch of *F. xylophylla*, Wall. Separate figures of very young twig, showing the undeveloped receptacles enclosed in *calyptriform* caducous bracts; views of receptacle from apex, base, and side; stipules: *all of natural size.*

PLATE 82^q.—1, male flower; 2 & 3, gall flowers; 4, fertile female achene: *all enlarged.*

27. FICUS FORSTENII, *Miq. in Ann. Mus. Lugd. Bat.* iii. 214, 285.

A tree; the young parts puberulous. Leaves very coriaceous, oblong-elliptic or obovate-oblong, shortly, narrowly, and rather abruptly apiculate, with entire cartilaginous, slightly revolute, sub-undulate margins and rounded or narrow, not cordate, 3-nerved base; lateral primary nerves 6 to 8 pairs, depressed above, very prominent beneath, curving and anastomosing slightly within the margin; shining and smooth above, puberulous below; 5 to 8 in. long by 2 to 3·25 in. broad; petioles stout, ·9 to 1·2 in. long; stipules in pairs, coriaceous, ovate-lanceolate, acuminate, densely whitish tomentose outside, glabrous inside, deciduous, ·75 in. long; receptacles sessile, axillary, in pairs, ovoid-cylindric, glabrous, with 2 to 3 broad, overlapping apical scales, not umbonate when ripe, ·6 in. to ·7 in. long by ·5 in. across; basal bracts 3, large, ovate-rotund, deciduously pubescent and thickened along the middle, the edges glabrous; male flowers numerous, scattered all over interior of the receptacles on thick flat pedicels; perianth of 2 or 3 broad concave involute pieces; stamen 1, the anther elongate; gall and fertile female flowers almost alike, the latter very few, the perianth of both of about 4 lanceolate pieces; achene of fertile flower tuberculate.

Celebes,—*Forsten*; Celebes, Borneo, Timor,—*Teysmann.*

Each of the young receptacles is enveloped in 2 short, blunt, cartilaginous, tomentose, calyptriform bracts, which are early deciduous.

PLATE 29.—*F. Forstenii*, Miq. Branch with immature receptacles. Separate drawings showing 2 stipules, base, and apex of immature receptacles: *all of natural* size.

PLATE 82^r.—1, unexpanded male flower; 2, anther, the perianth being removed; 3, fertile female flower: *all enlarged.*

28. FICUS ALTISSIMA, *Bl. Bijd.* 444; *Miq. in Ann. Mus. Lugd. Bat.* iii. 285; *Kurz For. Flora Brit. Burm.* ii. 442.—*Urost. altissimum*, Miq. in Zoll. Syst. Verz. 90 & 96; Miq. Fl. Ind. Bat. i. pt. 2. 349.—*F. laccifera*, Roxb. Fl. Ind. iii. 545; Wight Ic. 656; Beddome Fl. Sylv. ii. 223; Brandis For. Flora 418; Kurz For. Flora Brit. Burm. ii. 441.—*Urost. altissimum*, Miq. Lond. Journ. Bot. vi. 575; Miq. in Ann. Mus. Lugd. Bat. iii. 285; Thwaites Enum. Pl. Cey. 265; Wall. Cat. 4559F, 4560 (in part).

A large spreading tree, with few aerial roots; the young parts puberulous, ultimately all glabrous, except the external surface of the stipules; leaves coriaceous, petiolate, broadly ovate-elliptic, rarely ovate-lanceolate, shortly and obtusely cuspidate, edges entire, base rounded, rarely narrowed, occasionally slightly unequal, but never cordate, 3- to 5-nerved; lateral primary nerves 5 or 6 pairs, distinct; length 4 to 7 in.; petioles ·75 to 1·5 in. long; stipules very coriaceous, lanceolate, greyish pubescent outside, glabrous inside, from 1 in. to 1·75 in. long; receptacles sessile, enveloped when young in early deciduous calyptriform bracts, in pairs, axillary, ovoid, smooth, when ripe lake-red or yellowish, ·75 in. to 1 in. long; basal bracts 3, short, broad, blunt, united at the base, pubescent or puberulous; male flowers scattered all over the interior of the receptacles, pedicillate, the perianth of 4 pieces; anther sub-sessile; gall and fertile female flowers with a similar gamophyllous deeply 4-cleft perianth; the ovary of the gall flower smooth, that of the fertile female minutely tuberculate; the style in both elongate; gall flowers sometimes pedicillate; fertile females usually sessile.

In the forests at the base of the Himalaya, from Nepal to Bhutan; on the plains and lower slopes of the hills in Assam, Chittagong, and Burmah; in Ceylon; and the Malayan Peninsula and Archipelago.

After much consideration and an examination of the material in the herbaria of Kew, Leiden, Utrecht, and Calcutta, I cannot see my way to keeping *F. laccifera*, Roxb. specifically distinct from *altissima*, Bl. In my opinion Roxburgh's species is merely a Northern form of *altissima*. It is best distinguished from typical *altissima* by its larger, thinner leaves. Kurz in *For. Flora Brit. Burm.* ii. 441) keeps up both species, but he describes them in almost identical terms. The diagnostic mark on which (in his *clavis* of the species) he relies to distinguish *altissima* is that its stipules and bracts (by bracts Kurz means the calyptriform involucres of the young receptacles) are both puberulous, the latter falling off early, whereas in *laccifera* the bracts are glabrous and persistent and the stipules are glabrous. But in his detailed description he says of *altissima*—"bracts very caducous;" and of *laccifera* he says—"bracts very deciduous." Miquel does not describe *laccifera*, Roxb. anywhere, but in his classification of the species of *Ficus* (*Ann. Mus. Lugd. Bat.* iii. 285 *et seq.*) he puts *altissima* and *laccifera* into different sections of his sub-genus *Urostigma*. The materials of each on which he worked in the herbaria at Leiden and Utrecht are scanty, and the sheets there named *laccifera* are not characteristic specimens of Roxburgh's plant. There is much confusion in the sheets issued by Wallich as *F. Indica* (No. 4560 of his Cat.), many of which belong to this species. In the Calcutta set, sheets 4560 C and I unmistakeably, and H doubtfully, belong to this. To add to the confusion, the Wallichian specimens under No. 4560 in the Linnæan Society's, and those at Kew and in M. de Candolle's herbarium, do not in all cases agree. It is therefore of very little use to quote the letters. But in all four herbaria the specimens named in Hamilton's handwriting *F. Peguensis* and *F. varinga* are true *laccifera*, Roxb. Zoll.'s No. 2616 is typical *F. altissima*, Bl.

VAR. FERGUSSONI.

Leaves narrower than in the typical form, often narrowed at the base; lateral main nerves closer than in type, 9 to 12 pairs; receptacles sub-globular, smaller than in the type.

Ceylon,—*Thwaites*, C. P. 2291.

This variety, which I have named in honour of my friend Mr. W. Fergusson, F.L.S., an indefatigable botanist, is peculiar to Ceylon, where, Dr. Trimen informs me, it is truly indigenous. It was issued by the late Dr. Thwaites as C. P. 2221.

PLATE 30.—*F. altissima*, Bl. Fruiting-twig of the form found in the Malayan region, with immature receptacles. 1, mature receptacles; 2, base of receptacle; 3, apex of ditto; 4, stipules: *all of natural size.*

PLATE 82^{c}.—1, male flower, the anther being removed; 2, the same, the perianth being removed; 3, perianth of gall and female flowers; 4, achene of gall flowers; 5, achene of female flower: *all enlarged.*

PLATE 30A.—*F. altissima*, Bl. The form found in Northern India and Burmah, and which was named by Roxburgh *F. laccifera.* Separate figures of two of the large caducous leaf-scales (stipules) of the expanding leaf bud: *copied from Roxburgh's original drawing and of natural size.*

PLATE 82^{d}.—1, male flower, the anther being removed; 2, the same, with the perianth removed; 3, pedicillate gall flower; 4, fertile female achene: *enlarged.*

PLATE 31.—Three forms of *F. altissima*, Bl.—

A. Typical *altissima*, Bl. from Malaya. 1, apex of receptacle; 2, base of ditto; 3, stipule: *the receptacles are immature.*

B. Leaf of the form named *laccifera* from N. India.

C. Twig of the variety *Fergussoni* from Ceylon (the receptacles immature) *all of natural size.*

29. FICUS CYCLONEURA, *Miq.* (*sub Urost.*) *Fl. Ind. Bat. Supp.* 176, 438.

A glabrous tree, the young branches with pale yellow bark; leaves coriaceous, shortly petiolate, broadly ovate or elliptic, shining on both surfaces, apex with an abrupt short point, edges entire, base much rounded not narrowed or cordate, with 2 prominent supra-basal nerves which sweep round and join the marginal anastomoses of the lateral nerves; lateral primary nerves 4 pairs, not prominent; length of blade 3·5 to 4 in.; petioles stout, ·6 in. long; stipules glabrous, ovate-lanceolate; receptacles sessile, axillary, in pairs, smooth, depressed-globular, ·2 in. across, the apical scales forming a small projecting umbilicus; basal bracts 3, short, broadly ovate-rotund, glabrous; male flowers rather numerous, scattered, the perianth of 4 concave pieces; anther single, on a rather long filament; gall and fertile female flowers similar except as regards achenes, the perianth of 5 lanceolate pieces, style elongate, stigma oblique.

Sumatra,—*Teysmann*; Borneo,—*Beccari*, P. B. 3353.

The original specimen on which Miquel founded this species is a poor fragment; but Signor Beccari's specimens are excellent, and from one of them the figure has been drawn.

PLATE 32.—Fruiting-branch of *F. cycloneura*, Miq.: *of natural size.* 1, base of receptacle; 2, side view of same; 3, a single basal bract; 4, stipules: *twice natural size.*

PLATE 82^{t}.—5, male flower; 6, female flower: *much enlarged.*

30. Ficus lowii, *nov. spec.*

A powerful climber, the young branches and stipules covered with a deciduous brown scurf, ultimately these, as are all the other parts, glabrous. Leaves very coriaceous, oblong, or elliptic, the apex rather suddenly and shortly cuspidate, the margins thickened and strongly revolute, base rounded or tapering slightly to the petiole, strongly 3-nerved, midrib very prominent; lateral nerves only about 6 pairs, not prominent, reticulations obscure; lower surface dull whitish, upper smooth, rather dull; length 5 to 8 in.; petiole stout, from 1 to 1·75 in. long; stipules ovate-acuminate, convolute, from ·5 to 1 in. long; receptacles crowded, sessile, axillary, in pairs, globular, with a broad, flat, apical mamilla; apical scales 3, flat; yellow with purplish spots when ripe, and about ·75 in. across; basal bracts 3, rather small, broad, coriaceous; male flowers scattered over whole interior surface of receptacle, on thick pedicels, the perianth of 4 pieces; anther 1, sessile, elongate; gall flower pedicillate or sessile, the perianth of 5 distinct pieces, ovary smooth, style elongate, lateral, stigma elongate flat, bilobed; fertile female flower sessile, globose, tuberculate, with long style and clavate stigma; when ripe the perianth degenerates into a glairy cellular mass.

Malayan Peninsula, in the province of Perak,—*Kunstler*, *Wray*.

A remarkable species, very distinct from any other *Urostigma*. The leaves are very pale in colour when dry, and are of a dull white beneath.

I have named this after the Hon'ble Sir Hugh Low, British Resident in Perak, whose interest in horticulture and botany is so well known.

Plate 33.—*F. Lowii*, King. Fruiting-branch with rather small leaves. On the left hand corner is a larger leaf, on the right are two stipules and base and apex of a receptacle: *all of natural size.*

Plate 82^{u}.—1, unexpanded male flower; 2, anther, the perianth being removed; 3, gall flower; 4, fertile female flower: *enlarged.*

31. Ficus pachyphylla, *nov. spec.*

A climber? The young branches slightly covered with purplish scurf, but ultimately, like all the other parts, quite glabrous; leaves petiolate, thickly coriaceous, oblanceolate or narrowly ovate-elliptic, shortly and bluntly cuspidate, edges entire, slightly revolute, base narrowed, 3-nerved; lateral primary nerves 7 to 8 pairs, not prominent, reticulations indistinct; lower surface dull, upper surface shining; length about 5 in.; petioles ·75 in., stout; stipules ovate-acuminate, about ·5 in. long; receptacles axillary, in pairs, sessile, turbinate to ovoid, apex slightly umbonate, surrounded by a small annulus, apert, smooth; sides neither ridged nor grooved; ·5 in. long; basal bracts 3, broadly ovate-acute, their apices slightly thickened; male flowers numerous, scattered, pedicillate, the anther sessile, perianth of 3 or 4 pieces; gall flowers sessile or pedicillate, the style elongate, stigma sometimes unequally bifid; fertile female flowers very few, mostly sessile, the perianth, as in the galls, gamophyllous, 5-cleft, the achene tuberculate.

Sarawak in Borneo,—*Beccari*, P. B. 1303.

Collected only by Signor Beccari. A species resembling *F. globosa*, Bl., var. *manok*, but the leaves with a much firmer texture and narrowed at the base, and the receptacles sessile.

Plate 34.—Fruiting-branch of *F. pachyphylla*, King, *of natural size.* 1, stipule; 2, lateral view of receptacle; 3, basal view of ditto; 4, basal bract: *Nos. 1 to 4 are twice the natural size.*

PLATE 82^{v}.—1, male flower; 2, sessile fertile female flower; 3, pedicillate gall flower: *enlarged.*

Sub-series 3.—Leaves coriaceous, tapering much at both base and apex; basal bracts of receptacles large and prominent.

32. FICUS KORTHALSII, *Miq in Ann. Mus. Lugd. Bat.* iii. 215, 286.

Young branches, receptacles and basal bracts covered with deciduous purplish-brown scurf, ultimately, like all the other parts except the stipules, glabrous; leaves coriaceous, ovate-lanceolate, apex rather abruptly and shortly cuspidate, margins entire, undulate, thickened; base slightly narrowed or rounded, 5-nerved (2 of the nerves minute); primary lateral nerves 7 or 8 pairs, not very prominent, intermediate nerves and reticulations obscure; length of blade 6 to 8 in.; petiole from ·75 in. to 1 in.; stipules coriaceous, ovate-lanceolate, densely pubescent along the midrib (glabrous in var. *Beccariana*), with broad, glabrous, smooth margins, 1 in. long; receptacles axillary, sessile, solitary or in pairs, glabrous, globose when young, sub-ovoid or ellipsoid and umbonate when ripe; apical scales large; basal bracts 3, large, thick, ovate-rotund, adpressed; male flowers numerous, scattered, on very thick pedicels, the perianth of 4 concave pieces; the anther sessile; gall flowers shortly pedicillate, the perianth of 5 broadly lanceolate pieces, the ovary ovate-rotund, style infundibuliform; fertile female flowers not numerous, sessile, the perianth as in the gall flowers, but the pieces narrower; achene ovoid-reniform; the interior of the receptacle with many scales.

Borneo,—*Korthals.*

The solitary specimen of this in the Leiden Herbarium is the material on which Miquel founded this species.

VAR. BECCARIANA.

Stipules when adult quite glabrous.

Borneo,—*Beccari*, P. B. 1040, 2183, 2850.

Amongst Signor Beccari's collections are three plants which agree with Miquel's type specimen except as to stipules, which in Korthals' plant are pubescent.

Miquel remarks that this species resembles *F. elastica*, and there is, no doubt, a certain amount of resemblance to that species; but the main nerves are by far less numerous and their anastomoses are more intramarginal than in that species. Moreover the receptacles and stipules are quite different. Its affinities are in my opinion more with *F. Indica*, Linn. than with *elastica*. Further materials are required for the proper understanding of this species.

PLATE 35A.—Leaf, twig, and stipules of *F. Korthalsii*, Miq., var. *Beccariana*, King. 1, young receptacle; 2, mature receptacle; 3, stipule: *all of natural size and drawn from Signor Beccari's specimen P. B.* 2183.

PLATE 82^{w}.—4, male flower; 5, gall flower; 6, fertile female flower: *enlarged.*

33. FICUS CONSOCIATA, *Bl. Bijd.* 447; *Miq.* (*sub Urost.*) *in Zoll. Syst. Verz.* 91; *Fl. Ind. Bat.* i. *pt.* 2. 337; *Supp.* 177, 437; *Ann. Mus. Lugd. Bat* iii. 286.

A large tree (with aerial roots, *fide* Miquel); the young parts, but especially the under surface of the leaves, the bracts at the base of the receptacles, and the stipules, densely covered with reddish-brown flocculent deciduous tomentum, otherwise glabrous; leaves coriaceous, narrowly elliptic or oblanceolate (broadly sub-obovate-elliptic invar. *Murtoni*), with a rather short, blunt, abrupt acumen, edges entire, base narrowed, 3-nerved; lateral primary nerves distinct, not very prominent, from 5 to 8 pairs; length of blade 3 to 7 in., breadth 1·5 in. to 2·5 in.; petioles ·75 to 1·25 in. long; stipules membranous, ovate-lanceolate, at first densely tomentose, ultimately glabrous, ·75 to 1·25 in. long, caducous; receptacles crowded near the apices of the branches, axillary, sessile, depressed-spheroidal, flocculent when young, glabrous when ripe, about ·4 in. to ·6 in. across; apical bracts flat, shining; basal bracts 3, broadly ovate, keeled, sometimes bifid; male flowers numerous, scattered over the whole surface of the receptacle, pedicillate; the anther single, sessile, the perianth of 2 concave pieces; gall and fertile female flowers similar, sessile, the perianth of 5 pieces; the gall achene ovoid-reniform, that of the fertile female broadly ovoid, tuberculate, the perianth degenerate into gelatinous tissue.

Java and Sumatra.

Besides Blume's type specimen at Leiden and Zoll.'s (*Cat.* 561) there are but few examples of this in herbaria. The species comes near *procera*, Bl., and especially so through the variety *Murtoni*, but it is tomentose and has narrower leaves than *procera*.

VAR. MURTONI.

All parts larger and less flocculent than in the typical form; leaves sub-obovate-elliptic to ovate, with rounded or sub-cordate base; apex blunt; receptacles ·6 in. across.

Southern part of the Malayan Peninsula. Originally collected at Malacca by Griffith (4593), recently collected in Perak (*King's Collector*, 5330, 6460, 6692, 2512, 325). This form is intermediate between typical *procera*, Bl. and typical *consociata*, Bl. To the former it approximates by its more or less obovate-elliptic leaves, large receptacles, and smooth coriaceous basal bracts; to *consociata* it approximates in tomentum.

PLATE 36.—Fruiting-branch of *consociata*, Bl. Separate drawings of stipules and base and apex of receptacle: *of natural size.*

PLATE 37.—Fruiting-branch of *F. consociata*, Bl., var. *Murtoni*. 1, basal bracts after removal of receptacle; 2, apex of receptacle; 3, base of receptacle showing bracts; 4, terminal bud of a twig showing stipules: *of natural size.*

PLATE 82^x.—1, vertical section (from the side) of a male flower, showing the relation of the anther and perianth; 2 anther, the perianth being removed; 3, gall flower; 4, achene of fertile female: *all enlarged.*

34. FICUS INVOLUCRATA, *Bl. Bijd.* 447; *Miq.* (*sub Urost.*) *Fl. Ind. Bat.* i. *pt.* 2. 334; *Ann. Mus. Lugd. Bat.* iii. 286.—*F. macrocalyx*, Miq. in Ann. Mus. Lugd. Bat. iii. 217, 287, n. 76.

A large epiphyte; the young parts puberulous, but ultimately all parts glabrous except the stipules and basal bracts of the receptacles; leaves coriaceous, broadly elliptic or oval, abruptly and shortly apiculate; edges entire; base rounded or sub-acute, 5-nerved (2 of the nerves minute); lateral nerves about 5 pairs, not very distinct; length of blade 3 to 4 in.; petioles ·5 to ·8 in. long; stipules coriaceous, lanceolate, pubescent outside, ·75 to 1·3 in.; receptacles axillary, in pairs, sessile, umbonate when young; when ripe ovoid, yellow with red sides; apical scales broad, shining; basal bracts ovate-rotund, blunt, slightly united by their bases, covered outside with deciduous brown scales, large, fleshy, and completely enveloping the unripe receptacles; male flowers scattered over whole interior of receptacle, sessile, the perianth of 4 or 5 long pieces; anther single, ovate, apiculate, on a long filament, which is swollen near its apex; gall and fertile female flowers sessile, the perianth of 5 lanceolate pieces as long as the style; ovary of gall ovoid, smooth, of fertile female tuberculate and broader than the gall; style of both longer than ovary.

Western Java, at elevations of from 2,000 to 4,000 ft.,—*Forbes*, Nos. 629 and 696.

This species, by killing the tree on which it is epiphytal, often becomes an independent tree. It comes very near to *F. procera*, Bl., and I keep it up as a species with some reluctance. Its parts are all smaller than those of *procera*, and the leaves never incline to be obovate in shape. The main veins are by far less distinct, the petioles proportionately shorter, and the petioles thinner in texture than those of *procera*. Both have the same large fleshy bracts at the base of the receptacles.

Plate 38.—Fruiting-branch of *F. involucrata*, Bl. 1, receptacle seen from above; 2 & 3, receptacles seen from the side; 4, basal bracts; 5, stipules: *all of natural size.*

Plate 82^{y}.—1, male flower; 2, unexpanded female flower; 3, female flower; 4, achene of fertile female: *all enlarged.*

35. Ficus rigida, *Miq. Ann. Mus. Lugd. Bat.* iii. 280.—*Urost. rigidum*, Miq. Lond. Journ. Bot. vi. 578.

A tree? perfectly glabrous; leaves petiolate, coriaceous, lanceolate-acuminate or broadly oblanceolate, with the apex abruptly shortly and acutely cuspidate; the edges entire, recurved; the base acute, 3-nerved; primary lateral nerves 3 to 4 pairs, prominent beneath, the reticulations fine; upper surface dotted; length of blade 5·5 in. to 6·5 in.; petioles stout, ·75 inch long; stipules coriaceous, ovate-acuminate, ·7 in. long; receptacles axillary, sessile, in pairs, sub-globose, smooth, ·5 in. across; basal bracts 3, large, orbicular, glabrous; male flowers numerous, scattered, pedicillate, clavate when unexpanded, the perianth of 2 broad concave pieces; anther sagittate, on a short filament; gall flowers sessile or pedicillate, the perianth of 3 pieces, style short, achene ellipsoid; fertile female flowers sessile, the perianth of 4 or 5 narrow pieces, style elongate, achene tuberculate.

Penang,—*Phillips*; Perak,—*H. H. Kunstler*, No. 6044.

There are two specimens of this at Kew, both with immature receptacles.

Plate 39.—Fruiting-branch of *F. rigida*, Miq. with immature receptacles. 1, apex of a receptacle; 2, base of same; 3, stipules: *of natural size.*

Plate 82^{z}.—4, unexpanded male flower; 5, anther, the perianth being removed; 6, perianth of gall flower, the achene being removed; 7, achene of same; 8, fertile female flower: *all enlarged.*

36. Ficus procera, *Reinw. in Bl. Bijd.* 445; *Miq.* (*sub Urost.*) *Fl. Ind. Bat.* i. *pt.* 2. 336; *Supp.* 176, 436; *Ann. Mus. Lugd. Bat.* iii. 287.

A large tree; the young shoots puberulous, but ultimately, like all the other parts, glabrous; leaves coriaceous, elliptic, or sub-obovate-elliptic, rarely ovate, apex with a very abrupt, short, blunt acumen; edges thickened and slightly recurved: base rounded or narrowed, 3- to 5-nerved (2 of the nerves minute); lateral primary nerves about 5 pairs; length of blade 5 to 8 inches (11 inches in var. *crassiramea*); petioles 1 in. (to 2·25 in. in var. *crassiramea*); stipules fleshy, convolute, broadly-triangular, acute, pubescent outside, 1 in. to 1·5 in. long; receptacles axillary, in pairs, sessile, trigonous when young, when ripe depressed-spheroidal; ·7 in. across; orange with vermillion sides; apical scales large and shining; basal bracts 3, very large, broad, fleshy, almost completely enveloping the young and very prominent even in the ripe receptacles; male flowers numerous, scattered, the perianth of 3 elongated spathulate pieces; stamen single, on a long filament, which is thickened near the apex; gall flowers sessile or pedicillate, the perianth of 4 or 5 pieces, ovary elongated-ovoid; fertile female flowers sessile, the achene broadly ovate, tuberculate and viscid when ripe from the degeneration of the perianth.

VAR. CRASSIRAMEA.—*F. crassiramea*, Miq. (*sub Urost.*) Pl. Jungh. 48; Fl. Ind. Bat. i. pt. 2. 339; Ann. Mus. Lugd. Bat. iii. 287.

Miquel's description of *F. crassiramea* (*Pl. Jungh.* 48) is taken from a young twig with unusually elongate narrowed leaves. The type specimens at Leiden and Utrecht show *crassiramea* to be merely a form of *procera*, Reinw.

Java and Sumatra, from 200 to 5,000 ft.

PLATE 40.—Fruiting-branch of *F. procera*, Reinw. 1, apex of receptacle; 2, base of same; 3, stipules: *of natural size.*

PLATE 82²².—4, male flower; 5 sessile gall flower unexpanded; 6, pedicillate gall flower; 7, fertile female achene: *all enlarged.*

PLATE 41.—Fruiting-branch of *F. procera*, Reinw., var. *crassiramea*. Smaller drawings of stipules, basal bracts, and receptacle, seen laterally: *all of natural size.*

37. FICUS HOOKERI, *Miq. in Ann. Mus. Lugd. Bat.* iii. 215, 286.

A tree, with all its parts glabrous; leaves thinly coriaceous, long-petiolate, broadly elliptic or sub-obovate-elliptic, with short, broad, blunt apical cuspis, edges entire, base rounded or slightly narrowed, 3-nerved; lateral nerves 6 to 8 pairs, not very prominent; under surface pale; length 5 to 11 in.; stipules linear-lanceolate, flaccid, 1·5 to 3·5 in. long, caducous; receptacles axillary, in pairs, sessile, obovate, depressed, when ripe from ·5 in. to 1 in. across; the large basal bracts united to form an entire cartilaginous cup, which envelopes the lower third of the ripe receptacle; male flowers numerous, scattered, with no proper perianth, stamen single, on a long filament which is embraced by the lanceolate scales of the receptacle; gall and fertile female flowers alike, except as regards the contents of the ovary, the perianth of 4 or 5 linear-lanceolate pieces, achenes of a very dark-brownish colour, style rather short, thick.

Sikkim Himalaya and Khasi Hills. From 2,000 to 6,000 ft. Not common.

At once distinguished by the singular cup formed by the united basal bracts.

PLATE 42.—Fruiting-branch of *F. Hookeri*. Small drawings of vertical section of ripe receptacle and of an unfolding leaf bud showing the large fugacious stipules: *all of natural size.*

PLATE 82²³.—1, male flower; 2, female flower: *both enlarged.*

Sub-series 4.—Leaves coriaceous, tapering at base and apex; basal bracts of receptacles neither large nor prominent.

38. Ficus glaberrima, *Bl. Bijd.* 451; *Miq. in Ann. Mus. Lugd. Bat.* iii. 286.—*Urost glaberrimum*, Miq. Fl. Ind. Bat. i. pt. 2. 340.—*F. angustifolia*, Roxb. Fl. Ind. iii. 554.—*? F. bistipulata*, Griff. Notulæ Dicot. Pl. pt. 4. 398. t. 559. fig. 1.—*F. Thomsoni*, Miq. Ann. Mus. Lugd. Bat. iii. 215, 286; Kurz For Flora Brit. Burm. ii. 443.—*F. fraterna*, Miq. Ann. Mus Lugd. Bat. iii 217, 287.—*F. aurantiaca*, Wall. Cat. 4565 (*non* Griff.).

A tall glabrous tree, the under surfaces of the leaves and the young branches being minutely pubescent; leaves membranous, elliptic, oblong or ovate-lanceolate, apex acuminate, edges entire, base acute or narrowed, rarely rounded, 3-nerved; upper surface shining; lateral main nerves 8 to 10 pairs, at about right angles to the midrib, not very prominent; length of blade 5 to 8 in.; petioles ·8 to 1·25 in. long, slender; stipules glabrous, linear-lanceolate, fugacious, ·5 in. to ·75 in. long; receptacles pedunculate, axillary, in pairs, slightly verrucose when young, globular, smooth, orange-coloured when ripe and about ·25 in. in diameter; basal bracts 3, broad, minute, pubescent, deciduous; peduncles ·25 in. to ·35 in. long; male flowers few, and only near the mouth of the receptacles, sub-sessile, the perianth of 4 lanceolate pieces; stamen 1, the anther broad, the filament short; gall flowers sessile or on short thick pedicels, the perianth gamophyllous, 4-cleft; fertile females when ripe with viscid achenes and no perianth.

Damp forests along the base of the Himalaya from Bhutan to Dehra Dhun, in which latter locality it has only been once gathered (by Mr. Duthie, of the Saharunpore Botanic Garden); Burmah; the Andaman Islands; Java and other of the Malayan Islands, at elevations of from 1,000 to 3,500 ft. above the sea. The receptacles of this species are often attacked by an insect and become hypertrophied to three or four times their normal size. There is considerable diversity as to the persistence of the pubescence on the leaves in this species, the leaves of some individuals retaining their hairs much longer than others, but all ultimately becoming glabrous; and there are two distinct forms of the base of the leaf, specimens from Chittagong having leaf bases broad and rounded, while those from Sikkim and Khasi have much attenuate bases.

The specimen (*Ficus No. 123 Herb. Ind. Or. Hook. fil. and Thoms.*) on which Miquel founded his species *F. Thomsoni* agrees absolutely with the type of *F. glaberrima*, Bl. in Herb. Leiden and with specimens in Herb. Utrecht named *F. glaberrima*, Bl. in Miquel's own handwriting. Ficus No. 123 of Hook. fil. and Thomson's Indian Herbarium differs from No. 122 of the same herbarium (the type of *F. fraterna*, Miq.) only in the latter being absolutely glabrous. Moreover this No. 122 agrees in every respect with Roxburgh's unpublished drawing of his species *angustifolia*—a species, by the way, which Miquel does not account for. Griffith's figure of *bistipulata* agrees well with this plant, although his description does not. This species comes very near *F. nervosa*, Heyne and *F. pubinervis*, Bl., and I am inclined to think the three should be united specifically.

Plate 43.—Fruiting-branch of *F. glaberrima*, Bl. 1, base of receptacle; 2, apex of receptacle; 3, stipules: *all of natural size.*

Plate 82^{y2}.—4, male; 5, gall; 6, fertile female achene: *all enlarged.*

39. Ficus rowelliana, *nov. spec.*

A strong climber when adult; all parts except the receptacles quite glabrous; leaves petiolate, coriaceous, ovate-lanceolate, acuminate, with entire, cartilaginous, slightly revolute edges; base rounded, faintly 5-nerved; both surfaces shining, upper surface pale (when dry); lateral nerves about 6 pairs, not prominent, reticulations indistinct on both surfaces; length of blade 4 to 6 in.; petioles thick, succulent, ·5 in. long; stipules . . . . ; receptacles short-pedunculate (axillary?), slightly obovate or globose-umbonate, slightly pubescent; when ripe almost black (when young of a sepia colour with pale grey spots,—(*fide* Forbes), rather more than 1 in. across; peduncles ·6 in. long with 3 minute bracts about the middle; male flowers mixed with the gall flowers all over the inner surface of the receptacles, monandrous, the anther curved, the filament adnate; perianth of 2 to 3 short pieces; gall flowers sub-sessile, the perianth of 3 to 4 linear leaves, the ovary obovate or pyriform, with a short thick sub-terminal style; fertile female flowers not seen.

Eastern Sumatra, at 2,000 ft.,—*H. O. Forbes* (*Herb.* 3026).

This very distinct species has been collected only once, and the material is rather scanty. Mr. Forbes describes it as a gigantic climber. None of the specimens collected by Mr. Forbes have receptacles bearing fertile female flowers; the receptacles collected are all filled with male and gall flowers. I have named this species in honour of my friend Dr. Irvine Rowell, Surgeon-General to the Government of the Straits Settlements.

Plate 43A.—*F. Rowelliana*, King. 1 & 2, receptacles—*of natural size*; 3, male flower; 4, gall flower: *enlarged.*

40. Ficus microstoma, *Wall. Cat.* 4566.

A tree, with all its parts glabrous; leaves coriaceous, petiolate, ovate-elliptic to obovate-elliptic, the apices shortly, abruptly and bluntly cuspidate, or occasionally rounded, blunt, and non-cuspidate, the edges entire; base narrowed, 3-nerved; primary lateral nerves 4 to 7 pairs, rather prominent beneath; length of blade 3 in. to 6·5 in.; petioles ·5 in. to 1·25 in., rather slender; stipules ·5 in. long; receptacles sessile, in pairs, axillary, pisiform, dotted, glabrous, prominently umbonate; the apex perforated; basal bracts 3, broadly ovate, free; male flowers scattered over all parts of receptacle, pedicillate, the perianth of 2 broad concave pieces; anther 1, elongate; gall flowers with ovoid ovary and hooked stigma, the perianth, as in the fertile female, of 4 lanceolate pieces; fertile females with broadly ovate achene, the style not hooked.

Southern part of the Malayan Peninsula,—*Wallich*, *Kunstler.*

The scales, which usually overlap so as to close the apex of the receptacle in the genus *Ficus*, are in this species partially united to form a kind of annulus, in the centre of which there is a comparatively wide opening leading into the interior of the receptacle. While the receptacle is unripe, this annulus is of a bright yellow colour and is very conspicuous.

Miquel (*Zoll. Syst. Verz.* 96, and in *Ann. Mus. Lugd. Bat.* iii. 285) considers this to be very near the plant issued by Zollinger as No. 753 of his Herbarium, to which Miquel gives the name *Urost. manok*, and to *manok* he reduces *microstoma*, Wall. But a comparison of Zoll.'s No. 753 with the specimens issued by Wallich as *F. microstoma* convinces me that *F. microstoma*, Wall. is not only quite different from Zoll.'s No. 753, but that it is very distinct from any hitherto described species. *F. manok*, Miq. (Zoll. No. 753) appears to me to be the same as *F. globosa*, Bl., and to that species I reduce it. On the Linnæan Society's sheet of Wall. Cat. 4566 there are glued down three leaves of *F. onusta*, Wall. (which = *F. globosa*, Bl.), the other leaves and the receptacles belonging to true *microstoma*; and no doubt it is this confusion which misled Miquel. On the Calcutta Herbarium sheet of Wall.'s 4566 there is no such mixture, the whole being true *microstoma*, Wall.

PLATE 44.—Fruiting-branch of *F. microstoma*, Wall. Separate figures of a stipule and of base and apex of a receptacle: *all of natural size.*

PLATE 83ᵃ.—1, unexpanded male flower; 2, anther, the perianth being removed; 3, gall flower; 4, fertile female: *all enlarged.*

41. FICUS INDICA, *Linn. Sp. Plant. ed. 2. pt. 2.* 1514 (*in part*); *Miq. Ann. Mus. Lugd. Bat.* iii. 287 (*excl. many of the synonyms*); *Kurz For. Flora Brit. Burm.* ii. 442.—*F. sundiaca*, Bl. Bijd. 450.—*Urost. sundiacum*, Miq. Fl. Ind. Bat. i. pt. 2. 339 (in part).—*F. rubescens*, Bl. Bijd. 453.—*Urost. rubescens*, Miq. Fl. Ind. Bat. i. pt. 2. 338.—*Urost. tjiela*, Miq. (not Roxb.) Lond. Journ. Bot. vi. 580 (excl. syn.); Fl. Ind. Bat. i. pt. 2. 344 (excl. all synonyms except *Urost. sundiacum*, Miq.).—*Urost. tjiela*, Miq., *var. sundiaca*, Miq. Pl. Jungh. 50.—*F. pellucido-punctata*, Griff. Notulæ iv. 394. t. 554. i; Herb. Griff. 4636, Kew Distrib.—*F. longifolia*, Ham. in Wall. Cat. 4570, C, D, and E in part.—*Varinga latifolia*, Rumph. Herb. Amb. iii. 134. t. 84; also probably *F. pseudo-rubra*, Miq. in Ann. Mus. Lugd. Bat. iii. 287.—*Urost. pseudo-rubra*, Miq. Fl. Ind. Bat. i. pt. 2. 343 (partly).

A large spreading tree, glabrous in all its parts except the stipules; leaves coriaceous, shortly petiolate, from broadly to narrowly oblong, apex acute or shortly caudate-acuminate, edges entire, base narrowed, with 2 prominent and 2 small (occasionally obsolete) basal nerves; lateral primary nerves about 4 to 6 pairs, not very prominent, reticulations distinct; both surfaces (but especially the upper) minutely tuberculate; length of blade 4 to 7 in., and of petiole ·3 to 1 in.; stipules ovate-lanceolate, pubescent externally, ·5 to ·7 in. long; receptacles crowded, in pairs, sessile, from axils of leaves or of fallen leaves, globular (ovoid or ellipsoid in var. *Gelderi*), smooth, yellowish-red when ripe and about ·35 in. across; basal bracts 3, rather large, ovate-acute, spreading; male flowers numerous, scattered, on long thin pedicels, the perianth of about 2 concave pieces, the anther elongate, elliptic, sessile; gall and fertile female flowers alike, except as regards the contents of the ovary, ovary ovoid or elliptic, with a long lateral style and oblique infundibuliform stigma; ripe fertile achene tuberculate and viscid; gall flowers sometimes pedicillate.

Assam and Burmah, rare: common in the Malayan peninsula and Archipelago, also in the Philippines.

VAR. GELDERI.—*F. Gelderi*, Miq. in Ann. Mus. Lugd. Bat. iii. 216, 287.

Receptacles ovoid or ellipsoid, not globose.

Malayan Peninsula and Archipelago.

Linnæus quoted for his *Ficus Indica* so many plants—Indian, African, and American—that it is impossible to tell exactly what he intended to be considered as the type of this species. The name *Indica* has been by subsequent authors attached for the most part to the plant above described, because they believed it to be the plant intended to be portrayed in Rumphius's figure (*Herb. Amb.* iii. t. 84)—a figure which Linnæus did indeed quote under his *F. Indica.* But he also quoted other figures which do not resemble this, and it is therefore quite arbitrary to reserve the name *F. Indica,* Linn. for this plant. It would be, I believe, safer to abandon the name *Indica* altogether. I quote Blume's *sundiaca* and *rubescens* as synonyms of this with hesitation, for, of the specimens so named at Leiden and Utrecht, a good many belong to the plant accepted as the *F. nitida* of Thunberg. Blume's own description of *sundiaca* would really cover *nitida.* The only synonym I quote with any certainty is *pellucido-punctata,* Griff., for Griffith's figure and description answer well to this and can refer to nothing else. For convenience I here note how the citations of figures of Indian species of *Ficus* made by Linnæus under *F. Indica* in the second edition of his *Species Plantarum* have been disposed of by me:—

Katou alou, Rheede Hort. Malab. iii. t. 57, is *F. Mysorensis,* Heyne.
Varinga latifolia, Rumph. Herb. Amb. iii. t. 84, is retained as *F. Indica,* Linn.
Tsiela, Rheede Hort. Malab. iii. t. 63, is *F. tsiela,* Roxb.

PLATE 45.—Fruiting-branch of *F. Indica,* Linn. (upper twig); the same, var. *Gelderi* (lower twig). 1, 2, 4, 5, base and apex of receptacles; 3 & 6, stipules: *of natural size.*

PLATE 83^{b}.—7, unexpanded male flower; 8, male flower, showing anther and 2 perianth leaves; 9, sessile fertile female flower; 10, pedicillate gall flower: *all enlarged.*

42. FICUS SUMATRANA, *Miq. Ann Mus. Lugd. Bat.* iii. 287. t. 10. *fig. B.*—*Urost. Sumatrana,* Miq. Pl. Jungh. 49; Fl. Ind. Bat. i. pt. 2. 341.—*Urost. monadenum,* Miq. Fl. Ind. Bat. Supp. 438 (*fide* Miquel).

A glabrous tree; leaves thinly coriaceous, petiolate, narrowly oblong-lanceolate, apex acuminate, edges entire, slightly thickened and revolute, base acute, with 2 prominent and 2 faint basal nerves; lateral primary nerves about 4 pairs, rather prominent, reticulations rather fine; length of blade 4 to 5 in., of petioles 6 in.; stipules ovate-acuminate, ·75 in. long; receptacles in pairs, axillary, sessile, globular, umbonate, smooth, ·4 in. across; basal bracts 3, broad, rounded, membranous; male flowers few, scattered, on long thin pedicels, the perianth of 3 pieces; anther elongate, sessile; gall and fertile female flowers similar except in contents of ovary, sessile, the perianth of 3 pieces.

Sumatra,—*Junghuhn.*

A very little known species, poorly represented in the collections at Leiden and Utrecht. The leaves when dry are lustreless and of a curious pale brownish colour which is very characteristic. Judging from the imperfect specimens of *F. Zollingeriana,* Miq. which exist in the Dutch collections, that species must be very near, if not identical with, this.

PLATE 35B.—Fruiting-branch of *F. Sumatrana,* Miq. 2, basal bracts of receptacle; 3, base of receptacle; 4, apex of same; 5, stipules: *all of natural size.*

PLATE 83^{c}.—6, male flower; 7, female flower: *both enlarged.*

43. FICUS ACAMPTOPHYLLA, *Miq. in Ann. Mus. Lugd. Bat.* iii. 264, 287.—*Urost. acamptophyllum,* Miq. Fl. Ind. Bat. Supp. 176, 439.

A large tree, the young branches thinly covered with rufous scurf, pubescent towards the extremities; leaves thickly coriaceous, glabrous, sub-obovate, oblong, or elliptic, apex abruptly, shortly, and more or less bluntly cuspidate, margin entire, thickened, sub-revolute; base narrowed, 3-nerved; primary lateral nerves 3 to 6 pairs, not much more prominent than the secondary nerves, reticulations obscure; length of blade 2·5 to 4·5 in., of petiole ·6 to ·8 in.;

stipules ovate-acute, sericeous-pubescent externally, glabrous within, about ·5 in. long; receptacles numerous, crowded towards the extremities of the branches, in pairs from axils of leaves or of fallen leaves, turbinate, the apex much flattened, the umbilical scales large and smooth, yellow when ripe, ·25 in. across; basal bracts 3, large, ovate-rotund, puberulous; male flowers scattered, on long thin pedicels; anther elongate, sessile; the perianth of 2 or 3 concave pieces; gall and fertile female flowers similar except as regards contents of ovary, the perianth of 3 blunt pieces, style elongate, stigma slightly infundibuliform; fertile achene tuberculate.

A large tree, epiphytal in early life.

Malayan Peninsula, in Perak,—*Kunstler*; Banka,—*Teysmann*.

PLATE 46.—Fruiting-branch of *F. acamptophylla*, Miq. 2, leaf with very shortly cuspidate apex; 2, base of receptacle showing the bracts; 3, apex showing the apical scales; 4, stipules: *all of natural size.*

PLATE 83ᵈ.—5, unexpanded male flower; 6, male flower, the perianth being cut off; 7, female flower; 8, fertile achene: *all enlarged.*

44. FICUS BINNENDYKII, *Miq. Ann. Mus. Lugd. Bat.* iii. 288.—*Sub Urost.*, Fl. Ind. Bat. i. pt. 2. 341.

A glabrous tree; leaves petiolate, coriaceous, lanceolate, rarely oblanceolate, apex acuminate, margin entire, slightly revolute, base acute, rather prominently 3-nerved; lateral primary nerves about 5 pairs, not prominent, reticulations strong, but indistinct; length of blade 2·5 to 3 in.; petioles about ·5 in. long, not disarticulating from the blade when dry; stipules linear-lanceolate, convolute, ·7 in. long; receptacles small, crowded, sessile, in pairs, mostly from axils of fallen leaves, smooth, depressed-globose, ·2 in. across, with 3 rather large broadly-ovate, blunt, spreading, free basal bracts; male flowers more numerous than the females, scattered, sessile, the perianth of 3 broad elliptic pieces, with pellucid margins; anther single, on a short filament; gall and fertile female flowers similar except as to the contents of the ovary, sessile, the perianth of 3 or 4 pieces, ovary ovate-rotund, the style long sub-terminal.

Java,—Borneo.

Near *F. glabella*, Bl., but distinguished from that species by its smaller, more coriaceous, shorter, petiolate leaves, which rarely tend to be oblanceolate and are never obovate; also by its smaller receptacles, with basal bracts larger in proportion to the receptacles.

PLATE 47.—Two fruiting-branches of *F. Binnendykii*, the upper with larger receptacles than usual. 1, apex of receptacle; 2, base of ditto; 3, basal bracts; 4, stipules: *all of natural size.*

PLATE 83ᵉ.—5, male flower; 6, female flower; 7, achene of fertile female: *all enlarged.*

Sub-series 5.—Leaves coriaceous, narrowly elliptic or oblanceolate, with broad blunt apices.

45. FICUS TRUNCATA, *Miq. sub Urost. in Zoll. Syst. Verz.* 91, 97; *Miq. Fl. Ind. Bat.* i. *pt.* 2. 336; *Ann. Mus. Lugd. Bat.* iii. 286.

A small tree; the young parts, and especially the under surfaces of the leaves, thinly covered with brown deciduous powder, with which are mixed a few minute hairs, ultimately all parts glabrous; leaves coriaceous, crowded, short-petiolate, obovate or cuneate-oblong, with broad, blunt, sometimes truncate apex, entire edges and much-narrowed, strongly 3-nerved base; lateral primary nerves about 5 pairs, very prominent below, as are the reticulations; length of blade 2·5 to 4·5 in., of petiole ·3 to ·6 in.; stipules lanceolate, about ·5 in. long; receptacles much crowded near the apices of the branches, axillary, sessile, in pairs, depressed-spheroidal, reddish-yellow, smooth, and from ·2 to ·25 in. across when ripe; apical scales broad, flat, shining, surrounded by a ring; basal bracts 3, large, free, ovate-rotund; male flowers few, and only near the apex of receptacle, sessile, the perianth of 3 broad pieces, longer than the single ovate, sagittate, nearly sessile anther; gall and fertile female flowers sessile, with similar perianth of 4 or 5 small ovate pieces; ovary of galls ovoid-acuminate, with long straight terminal style; achene of fertile female ovate-rotund, tuberculate, the style sub-terminal and bent at right angles.

Borneo,—*Korthals*; Java, —*Zollinger*; Malayan Peninsula,—*Kunstler* (*King's Collector*), 1047, 6018.

A very distinct species.

Plate 48.—Fruiting-branch of *F. truncata*, Miq.; separate drawings of base and apex of receptacle and stipules: *all of natural size.*

Plate 83^{f}.— 1, male flower; 2, gall flower; 3, fertile female achene: *all enlarged.*

46. Ficus obtusifolia, *Roxb. Fl. Ind.* iii. 546; *Wight Ic. t.* 662; *Kurz For. Flora Brit. Burm.* ii. 443.—*Urost. obtusifolium*, Miq. in Lond. Journ. Bot. vi. 569. —*F. longifolia*, Herb. Ham. in Wall. Cat. 4570A, B.

A large tree, very often epiphytal at first, all parts glabrous; leaves thickly coriaceous, short-petioled, shining, oblong-elliptical or obovate-elliptical; apex rounded, blunt, or very slightly and bluntly apiculate; edges entire, slightly undulate; base acute, faintly 3-nerved; primary lateral nerves obscure, about 8 to 10 pairs; the secondary nerves nearly as prominent as the primary, the reticulations obsolete; length of blade 4 to 7 in.; petioles ·5 to ·75 in., stout; stipules lanceolate or ovate-acuminate, ·6 in. to 1 in. long; receptacles rather crowded, in pairs, sessile, axillary, but chiefly in the axils of the scars of fallen leaves, globular, slightly trigonous, depressed at the apex, yellowish when ripe and dotted; basal bracts 3, coriaceous, large, blunt, rounded, cordate; male flowers scattered, very numerous, on long pedicels, the perianth of 3 lanceolate pieces; gall flowers pedicillate or sessile, the perianth of about 4 pieces, ovary spherical, white, style sub-terminal, elongate: fertile female flowers sessile, the achene ovate-rotund, tuberculate and viscid from degeneration of its epidermal cells, the style lateral, as long as the achene, stigma infundibuliform.

Tropical forests of the base of the Eastern Himalaya; in Assam and in Burmah; Perak, in Malayan Peninsula.

Plate 49.—Fruiting-branch of *F. obtusifolia*, Roxb.; separate figures of base and apex of receptacles and of stipules of the ovate-acute form: *all of natural size.*

Plate 83^{g}.—1, male flower; 2, gall flower; 3, achene of fertile female: *all enlarged.*

Sub-series 6.—*Leaves coriaceous or sub-coriaceous, the primary and secondary nerves equally prominent, close together, straight and anastomosing little except near the margin.*

47. Ficus clusioides, *Miq. in Ann. Mus. Lugd. Bat.* iii. 286.—*Urost. clusioides*, Miq. in Lond. Journ. Bot. vi. 579.

A tree? all parts glabrous; leaves coriaceous, petiolate, obovate-oblong, sub-spathulate, apex blunt or very shortly and bluntly cuspidate, margin entire, thickened, base narrowed;

3- to 5- nerved; lateral primary nerves about 8 pairs. very little more prominent than the secondary nerves; length of blade 4 to 5·5 in ; petiole about 1 in.; stipules ovate-acute, coriaceous, ·6 in. long; receptacles axillary, in pairs, sessile, globular when young and inclosed within the 3 large rounded basal bracts; receptacles ·4 in. across.

Philippines,—*Cuming, Herb.* 1929; Luzon,—*Vidal.*

PLATE 50.—Leafy twig of *F. clusioides*, Miq. with immature receptacles—*from Cuming's Philippine specimen* (Miquel's type). Leafless twig with nearly mature receptacles—*from Vidal's Luzon specimen. Both of natural size.*

48. FICUS GARCINLÆFOLIA, *Miq. in Ann. Mus. Lugd. Bat.* iii. 218, 287.

A tree ? all parts glabrous; leaves membranous, petiolate, oblong or elliptic, apex acute, margin entire not thickened, base narrowed, with no special basal nerves; primary lateral nerves very numerous (15 to 20 pairs), not much more prominent than the secondary nerves and nearly at right angles to the thick midrib; length of blade 5 to 7 in., of petiole 1·5 in.; stipules broadly lanceolate-acuminate, puberulous externally, 1·5 in. long; receptacles sessile, ellipsoid, 1·2 in. long by ·6 in across, glabrous; basal bracts 3, ovate-obtuse, puberulous externally.

Timor,—*De Vriese.*

This species has been collected only in Timor. Its leaves resemble those of *F. elastica*, Roxb., in venation, but their texture is thinner, the stipules are smaller, and the receptacles are much larger than in that species.

PLATE 51B.—Leaf and receptacle of *F. garciniæfolia*, Miq.; 2, leaf from a different specimen; 3, stipules: *all of natural size.*

49. FICUS BENJAMINA, *Linn. Mantissa*, 129 (*excl. syn. Itti Alu, Rheede Hort. Malab.* i. *t.* 26); *Bl. Bijd.* 456; *Bedd. Fl. Sylv.* ii. 223; *Benth. Fl. Austral.* vi. 167; *Kurz For. Flora Brit. Burm.* ii. 446.—*Urost. Benjamina*, Miq. in Lond. Journ. Bot. vi. 583; Pl. Jungh. 50; Fl. Ind. Bat. i. pt. 2 346; Ann. Mus. Lugd. Bat. iii. 288; Dalz. and Gibs. Fl. Bomb. 242.—*F. nuda*, Miq. in Ann. Mus. Lugd. Bat. iii. 288.—*Urost. nudum*, Miq. in Lond. Journ. Bot. vi. 584.—*F. comosa*, Roxb. Corom. Pl. ii. t. 125; Willd. Spec. Plant. iv. 1148; Roxb. Fl. Ind. iii. 552; Bedd. Fl. Sylv. ii. 223; Wight Ic. 658.—*F. pendula*, Link. Enum. ii. 450.—*F. striata*, Roth Nov. Spec. Pl. 387?—*F. hæmatocarpa and neglecta*, Bl. ap. Decne in N. Ann. Mus. iii. 494-5; Miq. (*sub Urost.*) in Lond Journ. Bot. vi. 584.—*F. papyrifera*, Griff. Icon. Pl. As. t. 554.—*Varinga parvifolia*, Rumph. Herb. Amb. iii. t. 90. —*F. dictyophylla*, Wall. Cat. 4502A, B, and D.

An umbrageous tree, with drooping branches, all parts glabrous; leaves petiolate, thinly coriaceous, shining, more or less broadly ovate-elliptic, with a rather abruptly, shortly-acuminate apex, entire edges, and a rounded or sub-acute base; lateral primary nerves very numerous, close, straight, anastomosing just inside the margin; length of blade 2 to 4·5 in.; petioles ·4 to 1 in. long; stipules lanceolate, about ·5 in. long; receptacles axillary, sessile, in pairs, globular or ovoid, smooth and blood-red when ripe, about ·35 in. across, with 3 short, broad, rounded basal bracts, or globose, narrowed at the base and about ·75 in. across (var. *comosa*);

male flowers very few, scattered, pedicillate, the perianth of 2 large flat pieces; anther almost sessile; gall flowers mostly pedicillate, the perianth of 3 or 4 long spathulate pieces, ovary ovoid, smooth; fertile female flowers sessile, the perianth pieces short-spathulate, achene ovoid-reniform, longer than the style, stigma large.

Var. comosa.

Fruit large, globose, narrowed at the base, about ·75 in. across when ripe; pieces of the perianth of all the flowers lanceolate-acuminate, not spathulate.

The typical form is commonly planted all over the Malayan Peninsula and Archipelago, where it is usually known as *Waringin.* The only wild specimens I have seen in herbaria are from Timor, Sumatra, and Celebes. Beddome and Dalzell quote it from Western Peninsular India, but I have never seen a wild specimen from that quarter. The variety *comosa* is common and wild in the eastern (less so in the western) hills of the Indian Peninsula, at the base of the Eastern Himalayas, in other hilly parts of Assam, Chittagong, and Burmah. Except by the fruit, the variety is absolutely undistinguishable in field or herbarium from the typical form.

The Linnæan name *Benjamina* is retained for this species, as it is undesirable to alter names long current. But it is not at all clear that Linnæus did not (as Roxburgh understood him to do) mean this name to be applied to the species named below *retusa* var. *nitida.* In his *Coromandel Plants* Roxburgh published, in 1798, an excellent figure and description of *F. comosa*, and I rather think his is the name which ought to be kept up.

Plate 52.—Fruiting-branch of *F. Benjamina*, Linn. Separate figures of apex and base of receptacle, basal bracts, and stipules: *of natural size.* B.—Fruiting-branch of var. *comosa*: *of natural size.*

Plate 83^{h}.—1, male flower; 2, pedicillate gall flower; 3, fertile female: *all enlarged.*

50. Ficus stricta, *Miq. in Ann. Mus. Lugd. Bat.* iii. 288.—*Urost. strictum*, Miq. Pl. Jungh. 50; Fl. Ind. Bat. i. pt. 2. 344; Zoll. Syst. Verz. 91.

A tall tree (*fide* Miquel), of which all parts are glabrous; leaves coriaceous, petiolate, oblong to ovate-lanceolate, slightly inequilateral, the apex acute, margin entire, thickened, base rounded or narrowed, not nerved; primary lateral nerves not more prominent than the secondary nerves, all straight, nearly at right angles to the thick and prominent midrib and anastomosing near the margin; length of blade 3·5 to 5 in.; petioles stout, about ·5 in. long; stipules lanceolate, ·35 to 1 in. long, coriaceous; receptacles sessile, axillary, in pairs, globular, smooth, about ·7 in. across, yellow when ripe; basal bracts persistent, rather large, broadly ovate-cordate at the base; male flowers scattered, not numerous, elongate, sessile, the perianth of 3 spathulate pieces; stamen single, the anther cordate, on a long thin filament; gall flowers sessile or pedicillate, the perianth gamophyllous 4-toothed, the ovary smooth, style rather short; fertile females sessile, the perianth of 4 acuminate pieces, style elongate, stigma flat, achene minutely tuberculate.

Western Java.

A species closely allied to *F. Benjamina*, Linn. by its venation, and also to *F. elastica*, Bl.

Plate 53.—Fruiting-branch of *F. stricta*, Miq. with separate figures of apex and base of a receptacle and of stipules: *all of natural size.*

Plate 83^{h2}.—1, male flower; 2, pedicillate gall flower; 3, fertile female flower: *all enlarged.*

51. Ficus elastica, *Roxb. Hort. Beng.* 65; *Bl. in Bijd.* 446; *Roxb. Fl. Ind.* iii. 541; *Wight Ic.* 663; *Griff. Ic. Pl. As. Dicot. t.* 552; *Brandis For. Flora* 417; *Kurz For. Flora Brit. Burm.* ii. 444.—*Urost. elasticum*, Miq. Lond. Journ. Bot. vi. 578; Fl. Ind. Bat. i. pt. 2. 347. tab. 23; Wall. Cat. 4557A, B, C, D.—*Visiania elastica*, Gasp. Nov. Gen. Fic. 9.—*Macrophthalma elastica*, Gasp. Ric. 83. tab. 8.—*Var minor*, *Urost. circumcissum*, Miq. Pl. Jungh. 292; Fl. Ind. Bat. i. pt. 2. 344.—*Urost. karet*, Miq. l. c. 348.—*Urost. odoratum*, Miq. Pl. Jungh. 49; Fl. Ind. Bat. i. pt. 2. 348. tab. 24.

A large tree, usually epiphytic, all parts quite glabrous; leaves shortly petiolate, coriaceous, shining, oblong to elliptic, apex with a rather abrupt, bluntish caudicle, edges entire, base rounded or narrowed, obscurely 3- to 5-nerved; lateral primary nerves numerous, but hardly to be distinguished from the numerous secondary nerves, all diverging nearly at right angles from the thick prominent midrib and running nearly straight almost to the margin; length of blade 3 to 12 inches, of petiole 1 to 2·5 in.; stipule single, sub-persistent, coloured, almost half as long as the leaves, lanceolate, flaccid; receptacles in pairs, sessile, in the axils of fallen leaves, covered at first by hooded involucres which fall off and leave a basal involucral entire-edged cup, when ripe ovate-oblong, smooth, greenish yellow, about ·5 in. long; male flowers scattered over interior of receptacle, pedicillate, the perianth of 4 ovate pieces; anther ovate, sessile; gall flowers with 4-leaved perianth, the ovary smooth, style sub-terminal, hooked; fertile female flowers mostly sessile, the achene ovoid tuberculate, style long, stigma large sub-capitate.

In damp forests at the base of the Eastern Himalaya, the Khasi Hills, Assam, Burmah, and the Malayan region—generally epiphytic.

This species, in spite of the numerous names which it has received, is not in reality very variable. The greatest difference observable is that between the leaves of old fruiting-branches and those on young shoots, the former being very much smaller and broader in proportion than those of the latter. In all states the close parallel straight nervation of the leaves (almost resembling that of a monocotyledon) and the enormous "stipules" form unmistakeable diagnostic marks.

This species was originally named *elastica* by Roxb., and plants under this name were sent to Java, where however the plant is indigenous and is known to the natives as *karet*—a name subsequently utilised as a specific name by Miquel. Blume published a description of the plant under Roxburgh's name in his *Bijdragen*, which appeared seven years before Roxburgh's *Flora Indica* was published, the death of the latter botanist having caused the publication of his *Flora Indica* to be delayed until 1832.

In this species are well developed the involucral hoods which cover the young receptacles in many species of the section *Urostigma*, but which usually fall off very early and are rarely seen in dried specimens. In *F. elastica* these persist for some time, and are often seen even in old herbarium specimens. The leaf-scales, too, which cover the young buds, and which in many (especially of the deciduous) species of *Ficus* grow *pari passu* with the leaves, but fall off before the latter have obtained their full size, here persist until the leaves are nearly full grown. They are very large and coloured, and are ordinarily called 'stipules.'

Plate 54.—*F. elastica*, Roxb. Fruiting-branch. 8, stipules; 9 & 10, apex and base of receptacles: *of natural size.* 1, vertical section of receptacle; 2, male flower; 5, the same, the

perianth being removed; 6, the same, the perianth being opened out and the anther removed; 3 & 4, gall flowers; 7, achene of fertile female flower: *all enlarged.*

52. FICUS TRIMENI, *King in Journ. Bot.* xxiii. 242.—*Urost. tjiela*, Thwaites' Ceylon Plants, 2220.

A gigantic tree, with very few aerial roots, all parts glabrous; leaves coriaceous, elliptic, with an acute apex, entire edges, and a slightly tapering obscurely 3-nerved base; primary lateral nerves diverging at a low angle from the thick prominent midrib, very numerous, close, straight, anastomosing just within the slightly thickened revolute margin; length of blade from 3 to 4·5 in.; petioles about ·75 in. long, stout; stipules ovate-acuminate, ·4 to ·6 in. long; receptacles sessile, in pairs, axillary, globular, slightly verrucose when ripe, ·4 to ·5 in. across, with 3 small, spreading, ovate-cordate, slightly pubescent, basal bracts; male flowers scattered, pedunculate, the perianth of 3 broadly ovate pieces; the anther sessile; gall flowers pedicillate; fertile females sessile, the perianth of both of 5 lanceolate pieces, the achenes similar except as to contents, style of both elongate, stigma flattened, especially in the gall flower.

Canara, Dharwar, and Bellary districts in Western Peninsula of India,—*Law*; Ceylon,—*Thwaites*, *Trimen.*

This species approaches *tsiela*, Roxb. and *retusa*, Linn., var. *nitida*, but differs from both by its more numerous straight primary nerves, much more spreading habit, and fewer aerial roots.

PLATE 55.—Branch of *F. Trimeni* with young receptacles. Separate figures of young receptacles and of stipule; separate figure of twig with 2 mature receptacles: *all of natural size.*

PLATE 83^{i}.—1, male flower; 2, gall flower; 3, fertile female: *all enlarged.*

Sub-series 7.—*Leaves sub coriaceous, ovate or elliptic, often sub-obovate or sub-lanceolate; the secondary lateral nerves almost as prominent as the primary, the anastomoses numerous, minute, but distinct.*

53. FICUS DUBIA, *Wall. Cat.* 4561.

An epiphytal climber or small umbrageous tree, all parts glabrous; leaves petiolate and thickly coriaceous, shining, from broadly oblanceolate to elliptic, apex acute, edges entire, base narrowed, 3-nerved; primary lateral nerves 6 to 8 pairs, reticulations minute but distinct; length of blade 4 to 5 in.; petioles about ·75 in. long, rather stout; stipules linear-lanceolate, flaccid, caducous, from 1·25 to 2·5 in. long; receptacles pedunculate, solitary (by abortion), axillary, ovoid-globose, slightly narrowed to the peduncle, smooth, of a dull red with yellowish spots when ripe, from 1 in. to 1·35 in. across; peduncle thick, ·25 in. long, with 3 short, broad, rounded bracts at its base; male flowers numerous, scattered, elongate, the perianth of 3 elongate spathulate pieces; stamen 1, on a long filament; gall flowers with perianth like the males, the ovary ovoid, on a pedicel as long as the perianth, style short, sub-terminal; fertile female flowers sessile, the perianth of 3 long lanceolate-acuminate pieces, style longer than the smooth-ovoid achene; the flowers mixed with numerous linear bracteoles.

Penang,—*Wallich*; Sumatra,—*Forbes*, 3077; Malacca,—*King*.

A very distinct species. with stipules like those of *F. elastica*, but smaller.

PLATE 56.—Fruiting-branch of *F. dubia*, Wall., with separate figures of receptacles, basal bracts, peduncle, and stipule: *all of natural size.*

PLATE 83^{k}.—1, male flower; 2, gall flower; 3, fertile female: *all enlarged.*

54. FICUS KURZII, *King*.—*F. nuda*. *Miq.*, *var. macrocarpa*, Kurz For. Flora Brit Burm. ii. 445.—? *F. euphylla*, Kurz l. c.

A tree; all parts glabrous; leaves petiolate, thinly coriaceous, ovate-elliptic or elliptic, upper surface minutely tuberculate, apex shortly acuminate, edges entire, base narrowed, obscurely 3-nerved; primary lateral nerves 10 to 14 pairs, obsolete on the upper, distinct on the lower surface, diverging from the midrib at a high angle; secondary nerves almost as prominent as the primary and more numerous; length of blade 4 in., of petioles about ·5 in.; stipules lanceolate, glabrous, ·3 in. long; receptacles axillary, pedunculate (in pairs?), globular; when ripe about ·6 in. across, dark purple in colour, and apparently tubercled; apical scales prominent; bracts at base of receptacle none, but at base of the peduncle are 3 minute, glabrous, caducous bracts; male flowers few, and only near the mouth of the receptacle, on thick pedicels, the perianth of 2 broad, ovate, hyaline pieces; the anther single, ovate-rotund, sessile; gall flowers pedicillate, the perianth gamophyllous, 4-toothed, ovary ovate, with broad ends, smooth; style elongate, stigma flat; fertile female flowers sessile, the achene ovate-reniform, minutely tuberculate.

Burmah,—*Kurz*; Java,—*Zollinger*, *Herb.* 2228.

Only a few specimens of this exist in herbaria. The fruit in Zollinger's specimens is tubercled, but this may have been occasioned in drying. Miquel in *Zoll. Syst. Verz.* 91 (erroneously as I believe) refers Zoll. 2228 to *F. nuda*, Miq., a species founded by him on two specimens from the Philippines (Cuming's No. 1932), and which I refer to *F. Benjamina*, Linn. The type specimen of *F. euphylla*, Kurz, has more coriaceous leaves with more prominent nervation than the specimens named *F. nuda*, *var. macrophylla*, and the receptacles are said to be sessile. The material is poor, and until better is forthcoming I refer *euphylla*, though doubtfully, to this species.

PLATE 57.—Two fruiting-twigs of *F. Kurzii*—the smaller with immature, the larger with mature receptacles; separate figures of receptacles and stipules: *all of natural size.*

PLATE 83^{l}.—1, male flower, one of the perianth leave being pushed aside; 2, gall flower; 3, ovary of gall flower; 4, achene of fertile female flower: *all enlarged.*

55. FICUS RHODODENDRIFOLIA, *Miq. Ann. Mus. Lugd. Bat.* iii. 286.—*Urost. rhododrifol.*, Miq. Lond. Journ. Bot. vi. 579, *nec aliorum*; Kurz For. Flora Brit. Burm. ii. 445.

A tree; all parts except the stipules quite glabrous; leaves thinly coriaceous, shining, smooth, elongate-elliptic or oblong, rarely ovate-elliptic, apex acuminate, edges entire, base narrowed or subcuneate, rarely rounded; main nerves slightly more prominent than the secondary, from 12 to 14 pairs, anastomosing near the margin; length of blade 4 to 5 in., of petioles ·5 to ·75 in.; stipules lanceolate, ·5 in. long, deciduously pubescent; receptacles axillary, in pairs, sessile, smooth, globular, purplish-red when ripe, about ·5 in.

across, with 3 broad, rounded, glabrous, persistent bracts at the base; male flowers few, and only near the mouth of the receptacle, sessile, the perianth of 2 broadly-ovate flat pieces, longer than the stamen; anther ovate, apiculate, with a very short filament; gall flowers shortly pedicillate, the perianth gamophyllous, with 3 sharp teeth, ovary globular, style elongate, stigma flat; fertile female flowers sessile, the perianth of 3 lanceolate pieces, achene triangular, the surface prominently but minutely tubercular, the style elongate, stigma small.

At the base of the Sikkim and Bhutan Himalaya, and of the Khasi and Pegu Hills.

A species badly represented in herbaria and not well understood.

Plate 58.—Fruiting-branch of *F. rhododendrifolia*, Miq., with separate figures of base and apex of receptacles and stipules: *all of natural size.*

Plate 83m.—1, male flower; 2, gall flower; 3, ovary of gall flower; 4, fertile female flower; 5, achene of fertile female: *all enlarged.*

56. Ficus caudiculata, *Trimen in Journ. Bot.* xxiii. 243.

A large tree; all parts glabrous; leaves petiolate, thickly membranous, narrowly elliptic, suddenly and shortly cuspidate at the apex, the edges entire, when dry sub-revolute, base broad, rounded, or sub-truncate; the primary lateral nerves prominent, about 12 pairs, nearly at right angles to the strong broad midrib, reticulations dark-coloured, small, but very distinct on the lower surface; length of blade 2·5 to 3·5 in.; petiole stout, about ·5 in. long; stipules ovate, much acuminate, about 1 in. long, membranous, rather persistent; receptacles shortly pedunculate, axillary, solitary, or in pairs, globular, smooth, bright red when ripe, about ·5 in. across; basal bracts 3, broad, blunt, united to form a shallow cup; peduncles ·2 in. long; male flowers few, scattered, sessile, the perianth of 3 lanceolate pieces, which scarcely cover the single stamen; anther ovate-apiculate, on a short broad filament; gall and fertile female flowers similar, except as regards the contents of the ovary, sessile or pedicillate, the perianth gamophyllous, 4- or 5-cleft, ovary ovoid, the style elongate when young, short when ripe from breaking off.

Ceylon, in the Western Province, at Paregodde and Padun Korle.

This species was first collected by my friend Dr. Trimen, Director of the Botanic Garden, Ceylon. Its affinities are with *F. nemoralis*, Wall., from which it is well distinct, having thicker and more elliptic leaves and larger stipules and receptacles.

Plate 58A.—Fruiting-branch of *F. caudiculata*, Trim. 1, apex of receptacle; 2, base of the same; 3, stipules—*all of natural size*; 4, male flower; 5, sessile fertile female flower; 6, gall flower: *enlarged.*

57. Ficus pisocarpa, *Bl. Bijd.* 454.—*Urost. pisocarpum*, Miq. Fl. Ind. Bat. i. pt. 2. 344.

A small tree; all parts except the stipules glabrous; leaves crowded about the extremities of the branches, membranous, elliptic, rarely sub-obovate elliptic; apex very shortly and abruptly cuspidate, margin entire, undulate, base 3-nerved, blunt, and rounded or very slightly narrowed; lateral primary nerves prominent, 5 to 7 pairs, reticulations fine, distinct; length of blade 1·75 in. to 2·5 in.; petioles slender, ·5 to ·75 in. long; stipules ovate-lanceolate, pubescent, externally, ·3 in. long; receptacles crowded along the branches, in pairs, from the axils of the scars of fallen leaves, sessile, small, turbinate-globose, smooth, ·25 in. across, with 3 board, blunt, basal bracts; male flower few and only near the mouth of the receptacles, sessile, the perianth of 2 broadly ovate pieces longer than the stamen; anther ovate, with a short filament; gall and fertile female flowers alike except in the contents of the ovary, the perianth of 1 or 2 hyaline pieces (in some absent); fertile achene elongate-ovoid, smooth, style elongate, stigma cylindric.

Perak,—*Kunstler* (*King's Collector*), 3555.

I have not seen the specimens from Java on which Blume founded the species, but Kunstler's plant agrees so well with Blume's description that I venture to publish a figure of it as true *pisocarpa*, Bl.

PLATE 59.—Fruiting-branch of *F. pisocarpa*, Bl. Separate figures of base and apex of receptacles and of stipules: *all of natural size.*

PLATE 83^{n}.—1, male flower; 2, female flower: *both enlarged.*

58. FICUS GLABELLA, *Bl. Bijd.* 452; *Ann. Mus. Lugd. Bat.* iii. 286.—*Urost. glabellum*, Miq. Fl. Ind. Bat. i. pt. 2. 340.—*Urost. canaliculatum*, Miq. Lond. Journ. Bot. vi. 579; Fl. Ind. Bat. i. pt. 2. 340; Zoll. Cat. 2979 [*Urost. Moritzianum*, Miq. Fl. Ind. Bat. i. pt. 2. 342; Zoll. Cat. 851 ?]; Wall. Cat. 4502E.—*F. parvifolia*, Miq. Ann. Mus. Lugd. Bat. iii. 286.—*Urost. parvifolium*, Miq. Lond. Journ. Bot. vi. 570; Fl. Ind. Bat. i. pt. 2. 343.—*F. affinis*, Wall. Cat. 4524; Kurz Flora Brit. Burm. ii. 444.—*F. subpedunculata*, Miq. Ann. Mus. Lugd. Bat. iii. 217, 286.—*F. Wightiana*, Benth. (not of Wall.) Fl. Hong-Kong 327.

A tree; the young parts sometimes pubescent, ultimately all parts glabrous; leaves petiolate, thinly coriaceous, obovate-oblong or oblanceolate, (ovate-lanceolate or lanceolate in vars. *affinis* and *concinna*; ovate-oblong with cordate base in var. *papuana*); apex rather abruptly and shortly cuspidate, margin entire; base 3-nerved, acute, or cuneate, rarely rounded, jointed to the petiole; lateral primary nerves 7 to 10 pairs, not very prominent, reticulations distinct; length of blade 2 to 4 in.; petioles ·75 in. to 1 in.; stipules ovate-lanceolate, ·4 in. long; receptacles in pairs, rather crowded, from the axils of the leaves, but mostly from the axils of the scars of fallen leaves, sessile, or very shortly pedunculate, spheroidal; the apex often slightly depressed; when ripe smooth, dark-bluish purple, sometimes with yellow dots, from ·2 to ·3 in. across; basal bracts minute, broadly triangular; peduncles when present from ·1 to ·2 in. long; male flowers few, and only near mouth of receptacle, sessile, the perianth of 2 ovate hyaline pieces larger than the single sub-sessile anther; gall and female flowers alike, except in the contents of the ovary, sessile or shortly pedicillate; the achene spherical or ovoid, smooth, the style very long, stigma obovate; perianth leaves 4, hyaline, free, sometimes absent.

In the Malayan Peninsula and Archipelago, Hong-Kong, the Andamans and Burmah, and in the tropical forests of the Eastern Himalaya and Khasi Hills.

This is rather a variable species. Miquel's *Urost. canaliculatum* (founded on Zoll 's specimen 2279) is undoubtedly referrible here. But *Urost. Moritzianum*, Miq. (founded on Zoll. 851), although ultimately reduced to *glabella* by Miquel himself, appears to me to differ in the nervation of the leaves, and I include it here with hesitation. Zollinger's material of both is, however, too scanty to be made much of. Miquel (in *Ann. Mus. Lugd. Bat.* iii. 286) reduces here *F. trinervia*, Herb. Reinw., of which I have seen no specimen. He also reduces *F. pisocarpa*, Bl., which I think is distinct and which I keep up. Three varieties may be distinguished.

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VAR. 1. AFFINIS.—*F. affinis*, Wall. Cat. 4524; Herb. Ind. Or. Hook. fil. and Thoms. 113; Herb. Griff. (Kew Distrib.) 4589, 4590.

Leaves ovate-lanceolate, acuminate, narrowed at the base, shining; lateral primary nerves often as many as 12 pairs; receptacles pedunculate.

This variety is found in the Eastern Himalaya, Khasi Hills, Chittagong, and Burmah. Wallich issued specimens of it as *F. affinis*, but it was not described under that name until the publication of Kurz's Flora of Burmah in 1877 (the *Urost. affine* described by Miquel in *Hook. Lond. Journ. Bot.* vi. 564 being quite different). Cuming's plant from Philippines, described by Miquel as *parvifolia* (l. c. 570), appears to be exactly the same as Wall. Cat. 4524. Miquel's *F. subpedunculata*, founded on specimens collected by Griffith issued from Kew under the No. 4589, is unmistakeably the same as Wall. Cat. 4524.

VAR. 2. CONCINNA.—*F. concinna*, Miq. Ann. Mus. Lugd. Bat. iii. 286.—*Urost. concinnum*, Miq. in Lond. Journ. Bot. vi. 570.

Leaves lanceolate or oblanceolate; petioles much elongate (1 in. to 1·3 in.).

Philippines,—*Cumming*, 1940.

VAR. 3. PAPUANA.—*F. nesophila*, Müll. M.S.; Miq. in Ann. Mus. Lugd. Bat. iii. 286; Benth. Fl. Austral. vi. 164.—*Urost. nesophilum*, Miq. in Journ. Bot. Neerl. 1861, p. 237.

Leaves ovate-oblong, with cordate bases.

New Guinea,—*Beccari*, P. B. 157; N. Australia, Queensland.

Mr. Bentham (l. c.) suggests that both *F. nesophila* and *F. Cunninghami*, Miq. may prove to be forms of *F. infectoria*, Roxb. As far as the material at Kew goes, I should refer the whole of the sheets named *F. Cunninghami* to *infectoria*, and most of them to its variety *Lambertiana*. Some of the sheets named *nesophila* are in my opinion *infectoria var. Lambertiana*, but the remainder appear to me to come nearer *F. glabella*, Bl., differing from the typical form of that species in the shorter cordate leaves.

PLATE 60.—Fruiting-branch of *F. glabella, typical form.* 1, base of receptacle; 2, apex of same; 3, stipules: *all of natural size.*

PLATE 83°.—4, male flower; 5, fertile female flower with perianth; 6, the same without perianth (shortly pedicillate); 7, ovary of gall flower: *all enlarged.*

59. FICUS RETUSA, *Linn. Mantissa*, 129; *Willd. Spec. Plant.* iv. 1147; *Benth. Fl. Hong-Kong*, 327; *Fl. Austral.* vi. 166; *Bedd. Fl. Sylv.* ii. 223; *Brandis For. Flora* 417; *Kurz For. Flora Brit. Burm.* ii. 444.—*F. dilatata*, Miq. in Ann. Mus. Lugd. Bat. iii. 218, 288.—*F. nitida*, Thunb. Fic. 14; Willd. Spec. Plant. iv. 1145; Blume Bijd. 455; Wight Ic. 642.—*F. rubra*, Roth. Nov. Spec. Pl. 391 (excl. syn.).—*F. littoralis*, Bl. Bijd. 455.—*F. microcarpa*, Linn. fil. Supp. 442.—*F. Benjamina*, Willd. Spec. Plant. iv. 1143 (excl. syn. Linn.); Roxb. Fl. Ind. iii. 550.—*Urost. ovoideum (excl. syn.), pisiferum, retusum, nitidum, and microcarpum*, Miq. in Lond. Journ. Bot. vi. 580 to 583.—*Urost. retusum, nitidum, and microcarpum*, Miq. in Fl. Ind. Bat. i. pt. 2. 345, 346.—*Urost. retusum and nitidum*, Miq. Dalz. Fl. Bomb. 241, 242; Wall. Cat. 4523, all the letters; 4530A and B; 4567; Rheede Hort. Malab. i. t. 26, iii. t. 55.

A large umbrageous evergreen tree, with a few aerial roots, all its parts quite glabrous; leaves shortly petiolate, coriaceous, shining, entire, ovate-rotund to obovate-rotund, apex blunt and rounded or very slightly apiculate, base more or less slightly narrowed or (in var. *nitida*) ovate or rhomboid-elliptic, with a slightly acute apex; or with an abrupt, short, blunt cuspis, the base much narrowed to the petiole; bases of leaves 3-nerved; lateral primary nerves 5 or 6 pairs, not much more prominent than the secondary nerves; length of blade 2 to 4 in., of petiole ·25 to ·5 in.; stipules lanceolate, about ·4 in. long; receptacles small, sessile, in pairs from the axils of the leaves or of the scars of the fallen leaves; depressed-globose, smooth, yellowish or reddish when ripe; about ·3 in across, with 3 broadly ovate, blunt, spreading, persistent basal bracts; male flowers numerous, scattered, sessile, or shortly pedicillate, the perianth of 3 sub-spathulate pieces; stamen single, the anther cordate-apiculate, on a filament as long as itself; gall flowers sessile or pedicillate, the perianth of 3 broadly spathulate pieces, ovary smooth; fertile female flowers sessile or pedicillate, the achene ovoid or obovoid, the perianth much smaller than in the gall; styles of both short, stigma cylindric or clavate.

Tropical forests of the Western Ghats of Peninsular India, and at the base of the Eastern Himalaya, Khasi Hills, Assam, Burmah, and the Malayan Peninsula and islands, Philippines, South China, and New Caledonia.

A widely distributed plant, and therefore presenting a variety of forms, many of which have, as in similar cases, received specific names. The forms, however, divide themselves into two groups, viz.—

a.—Typical form: those which correspond with *F. retusa* as originally described, with leaves inclining to rotund, very slightly apiculate, and with slightly narrowed bases. This form occurs in Peninsular India, which was the source of the specimen from which the description in the *Mantissa* was written. This form is also found in Penang and the islands of Ternate, Aru, and Boeroe, and on specimens from the latter two localities Miquel founded his species *dilatata*. It also occurs in Australia. In this variety female flowers are mostly sessile or sub-sessile.

b.—Variety nitida: those which correspond with the *F. nitida* as described by Thunberg, with ovate to rhomboid-elliptic, shortly apiculate leaves, which are narrowed at the base. This is the form found at the base of the Eastern Himalaya, in Assam, and the Khasi Hills, Burmah, and most of the Malayan countries. In this variety all the flowers are often pedicillate.

Miquel reduces to his *Urost. ovoideum* the *F. ovoidea* of Jack; but from Jack's original description it is absolutely certain that he had one of the forms of *F. diversifolia*, Bl. before his mind when he wrote it; and this apparently was Wallich's view, for the plant he issued as *F. ovoidea*, Jack (Cat. 4526) is unmistakeably a form of *F. diversifolia*, Bl.

PLATE 61.—Fruiting-branch of *F. retusa*, Linn. 1, apex of receptacle; 2, base of ditto; 3, stipules: *all of natural size.*

PLATE 84^{P}.—4, male flower; 5, gall; 6, fertile female: *all enlarged.*

PLATE 62.—Fruiting-branch of *F. retusa*, Linn., var. *nitida*. Smaller figures of base and apex of receptacle and of a stipule: *all of natural size.*

PLATE 84^{P}.—7, male flower; 8, gall; 9, fertile female: *all enlarged.*

60. FICUS TALBOTI, *nov. spec.*

A large tree, all parts glabrous; leaves petiolate, thinly coriaceous, shining on upper surface, ovate or elliptic, apex shortly caudate-acuminate, margin entire, base narrowed 3- to 5-nerved; primary lateral nerves 6 to 9 pairs, rather prominent on both surfaces; length of blade 3·5 to 4 in., of petioles ·75 in. to 1 in.; stipules ovate, about ·25 in. long; receptacles axillary, in pairs, sessile, obovoid, rather depressed at the apex, smooth; when ripe about ·25 in. across; basal bracts 3, ovate-acute; male flowers few, and only near the mouth of the receptacle, sessile, the perianth of 3 broadly ovate pieces; anther 1, on a short filament; gall flowers sessile or pedicillate, the perianth of 3 lanceolate pieces, ovary ovate, narrowed to each end, style terminal; fertile female flowers with perianth like the galls, the achene ovoid or obovoid, minutely tuberculate, the style short lateral.

Forests of Canara,— *W. A. Talbot*, 655 & 1100.

This species comes near *F. retusa*, Linn., but differs in form and venation of leaf.

Plate 63.—Fruiting-branch of *F. Talboti*, King. 1, apex of receptacle; 2, base of ditto; 3, stipules: *all of natural size.*

Plate 84q.—4, male flower; 5 & 6, gall flowers; 7, fertile achene: *all enlarged.*

61. Ficus callophylla, *Bl. Bijd.* 445; *Miq. in Ann. Mus. Lugd. Bat.* iii. 287; *Fl. Ind. Bat.* i. *pt.* 2. 349.

A tree? glabrous everywhere; leaves very coriaceous, petiolate, broadly elliptic or subobovate elliptic, apex rounded or with a very short, abrupt, blunt apiculus, edges entire, thickened, slightly revolute; base slightly narrowed, 3-nerved; lateral primary nerves about 8 pairs, not much more prominent than the secondary nerves, and, like them, diverging from the thick midrib at a higher angle than in *F. elastica*; length of blade 4·5 to 6 in.; petioles 1·25 in. long, stout; (stipules—*fide* Miquel—rigid, broadly lanceolate, covered externally with a whitish powder); receptacles sessile, in pairs, axillary; when ripe globular, smooth, about ·5 in. across; basal bracts 3, broad, rotund, coriaceous.

Java.

Of this species only a few specimens exist in herbaria. It must be near *elastica*, but I keep it distinct, as the nervation of the leaves differs from that in *elastica*, the primary nerves being fewer and more oblique and the edge being thickened and recurved; the stipules, moreover, are much shorter than those of *elastica*, the receptacles more globular.

In this species, as in *elastica*, the involucral hoods which cover the young receptacles are unusually persistent. In the only specimens which I have seen the receptacles are too young for the structure of the flowers to be made out.

Plate 51A.—Fruiting-branch of *F. callophylla*, Bl. 1, a stipule: *of natural size*

62. Ficus maclellandi, *nov. spec.*

A tree? the young parts softly tomentose, ultimately all parts glabrous except the stipules and receptacles; leaves coriaceous, oblong, or narrowly elliptic, the apex rather suddenly, bluntly, and shortly cuspidate, edges entire, base rounded or slightly narrowed, both surfaces in adult leaves minutely tuberculate; primary lateral nerves about 12 pairs, not much more prominent than the secondary nerves, reticulations rather small, distinct; length of blade 3·5 to 4·5 in.; petioles ·5 to ·7 in.; stipules lanceolate, tomentose, about ·3 in. long; receptacles in pairs, axillary, sessile, globose, covered with pale flocculent tomentum, about ·2 in. across; basal bracts broadly ovate, sericeous, small; male flowers not seen; female flowers sessile, the perianth of 3 lanceolate pieces, ovary ovoid-acuminate, the style terminal as long as ovary.

Pegu,—*Maclelland.*

This has been collected only once, and it is poorly represented in collections.

Plate 64.—Fruiting-branch of *F. Maclellandi*, King: *of natural size.* 1, stipule; 2 & 3, receptacles; 4, a basal bract: *enlarged.*

Plate 84^{r}.—5, young female flower, *enlarged.*

Sub series 8.—Leaves coriaceous, elliptic or oblanceolate; receptacles without basal bracts.

63. Ficus nervosa, *Heyne in Roth's Nov. Spec. Pl.* 338; *Wight Ic. t.* 660; *Miq. in Ann. Mus. Lugd. Bat.* iii, 286; *Benth. Fl. Hong-Kong*, 327; *Bedd. Fl. Sylv.* ii. 223.—*Urost. nervosum*, Miq. Lond. Journ. Bot. vi. 585.—*F. montana*, Wall. Cat. 4514A, B, C, D.—*F. magnoliæfolia*, Bl. Bijd. 448; Miq. in Ann. Mus. Lugd. Bat. iii. 263, 286.—*Urost. cuneuron*, Miq. Fl. Ind. Bat. i. pt. 2. 353.—*F. modesta*, Miq. in Ann. Mus. Lugd. Bat. iii. 286.—*Urost. modestum*, Miq. Lond. Journ. Bot. vi. 586.—*Var. longifolia*, Miq. Pl. Jungh. 51.

A tree; the young parts minutely adpressed-pubescent or puberulous, ultimately all parts glabrous except the stipules, the receptacles which are puberulous even when ripe, and occasionally the under surface of the midribs of the leaves which remain adpressed-pubescent; leaves thinly coriaceous, both surfaces shining, the lower minutely tuberculate, elliptic, oblong-lanceolate to obovate-elliptic or oblanceolate, slightly inequilateral, apex with an abrupt, rather narrow acumen, from ·5 to 1 in. long, edges entire, slightly undulate, and revolute, base narrowed, rarely rounded, slightly unequal, 3- to 5-nerved; lateral primary nerves 7 to 10 pairs, nearly at right angles to the midrib, prominent beneath; length of blade 3·5 to 8 in.; of petiole ·4 to ·5 in.; stipules lanceolate or ovate-lanceolate, membranous, puberulous, about ·5 in. long; receptacles pedunculate, axillary, in pairs, slightly verrucose when young; when ripe depressed-globose, puberulous, varying in size from a quarter to nearly one inch across; peduncles ·3 to ·6 in. long, slender, puberulous or glabrous, bearing near their origin from the stem 3 free ovate-rotund pubescent small bracts; male flowers few and only near mouth of receptacle, pedicillate, the perianth of 2 long spathulate pieces; anther single, attached by a filament as long as itself to one of the pieces of the perianth; gall flowers sessile or pedicillate, the perianth of 3 elongate, acuminate pieces, ovary ovoid, smooth, style short; fertile female flowers sessile, rarely pedicillate, the perianth of 3 lanceolate pieces, achene ovoid-acuminate, style twice as long as achene, stigma clavate.

Sikkim and Bhutan Himalaya, the hill ranges of Southern India, Khasi and Assam Hills, Burmah, the Malayan Peninsula and Archipelago, Hong-Kong, at elevations of from 2,000 to 3,000 ft. above the sea.

Var. minor.

Wall Cat. 4514C; Thwaites C. P. 2219; Enum. Pl. Ceylon 266 *sub nom. Urost. modestum*, Miq.

All parts smaller than in typical form and more puberulous; lateral primary nerves 5 to 7.

Nilgiri Hills, Ceylon.

Plate 65.—A.—Fruiting-branch of *F. nervosa*, Heyne. 1, lateral view of receptacle; 2, bracts of peduncle; 3, apex of receptacle; 4, stipules: *Nos.* 1 & 3 *are enlarged; the other*

figures are of natural size. B.—Var. *minor.*—Fruiting-branch. 5, receptacle seen from below; 6, ditto seen from above; 7, stipules: *all of natural size.* 8, male flower; 9 & 10, gall flowers; 11, fertile female flower: *enlarged.*

64. FICUS PUBINERVIS, *Bl. Bijd.* 452; *Decne in N. Ann. Mus.* iii. 496; *Miq. in Ann. Mus. Lugd. Bat.* iii. 286.—*Urost. Hasseltii,* Miq. Pl. Jungh. 46; Miq. Fl. Ind. Bat. i. pt. 2. 341.

A tree, the young parts more or less deciduously pubescent; leaves sub-coriaceous, from ovate-elliptic to lanceolate, tapering to a blunt short point, edges entire, base much narrowed, 3-nerved; glabrous when adult, except the midribs, which are adpressed-sericeous below; main lateral nerves 5 to 7 pairs, nearly at right angles to the midrib, not very prominent; length of blade 3 to 5 in.; petioles scurfy when young, ·2 to ·5 in. long; stipules lanceolate, convolute, 1 in. to 1·5 in. long, outside densely adpressed-sericeous, tawny, receptacles axillary, in pairs or solitary, very shortly pedunculate or sessile, sub-globose, umbonate, shortly puberulous when ripe, red in colour, ·35 in. to ·5 in. across; peduncles when present pubescent, about ·1 in. long, bearing 3 minute free bracteoles at their origin from the branch; male flowers few and only near mouth of receptacle, sessile, the perianth of 2 broadly ovate pieces larger than the single sub-sessile anther; gall and fertile female flowers alike when young, the perianth of 3 lanceolate pieces, the style lateral, elongate, the stigma flat; ripe fertile achene unknown.

Java, Sumatra, Borneo, and Timor—at elevations of from 3,000 to 4,000 ft.

VAR. TEYSMANNI.

Leaves coriaceous, obovate, suddenly and shortly acuminate, nerves very prominent.

Celebes,—*Teysmann.*

The leaves in this variety approach those of *F. vasculosa,* Wall., but the receptacles are exactly those of typical *pubinervis.*

TAB. 66.—Fruiting-branch of *F. pubinervis,* Bl., with separate figures to show base and apex of a receptacle and stipules: *all of natural size.*

PLATE 84^{s}.—1, male flower; 2, female flower (young): *enlarged.*

Series II.—Leaves sub-coriaceous, on long slender petioles, which are often jointed to the blade.

65. FICUS RUMPHII, *Bl. Bijd.* 437; *Decne in N. Ann. Mus.* iii. 493; *Miq. in Ann. Mus. Lugd. Bat.* iii. 287; *Kurz For. Flora Brit. Burm.* ii. 448.—*F. cordifolia,* Roxb. (non Bl.) Fl. Ind. iii. 548; Brandis F. Flora, 416. t. 48; Wight Ic. 640.—*Urost. Rumphii,* Miq. in Zoll. Syst. Verz. 90; Fl. Ind. Bat. i. pt. 2. 332.—*Urost. cordifolium,* Miq. Lond. Journ. Bot. vi. 564.—*F. species, Bhutan,* Griff. Itin. Notes iii. n. 145. tab. 549.—*Arbor conciliorum,* Rumph. Herb. Amb. iii. t. 91, 92; Wall. Cat. 4484, sheets A to G.

A large tree, often epiphytal; all parts glabrous; leaves sub-coriaceous, upper surface minutely tuberculate when dry, shining, long-petiolate, broadly ovate, with acuminate apex; edges entire, sub-undulate; base broad, but slightly narrowed towards the petiole, basal nerves

5, rarely 7 (2 being minute); lateral primary nerves 3 to 6 pairs, rather irregular, prominent only in the young state; length of blade 4 to 6 in., of which the acuminate apex forms only about one-sixth; petioles 2·5 to 3·5 in.; stipules ovate-lanceolate, from ·5 to 1 in. long; receptacles sessile, in pairs in axils of leaves or of leaf scars, globular, smooth, when young whitish with dark spots, when ripe nearly black; ·5 in. across; basal bracts 3, rotund, small; male flowers few, and only near mouth of receptacle, the perianth of 3 spathulate pieces; anther single, on a filament about as long as itself; gall and fertile female flowers with perianth of 3 lanceolate pieces; the gall ovary smooth and usually obovoid; the fertile achene minutely tuberculate, mucilaginous; style in both elongate, stigma clavate.

At low elevations on the drier slopes of the mountain ranges in Northern, Western, and Central India; in Burmah and the Malayan Peninsula and Archipelago.

Blume, in his *Bijdragen*, published in 1825, gave the name *F. Rumphii* to the *Arbor conciliorum* of Rumphius, and Roxburgh gave the name *F. cordifolia* (*Fl. Ind.* iii. 548) to the same plant, both authors quoting Rumphius' description and figures. But the name *F. cordifolia* was applied by Blume in the *Bijdragen* to a totally different tree, which is now known only by some meagre specimens in Blume's herbarium at Leiden. Blume's name for this species must therefore take the precedence of Roxburgh's; for Roxburgh's *Flora Indica*, although written early in the century (Roxburgh died in 1815), was not published in its entirety until 1832. The specimens of *F. cordifolia*, Bl. at Leiden are sufficient to show that it was not a *Urostigma*. The species is now practically lost, but I shall give a figure of it drawn from the material at Leiden.

F. Rumphii is allied to *F. religiosa*, but has leaves usually decidedly narrowed at the very base, with a less suddenly acuminate and shorter-tailed apex, and the globular receptacles are not depressed at the apex.

PLATE 67B.—Fruiting-branch of *F. Rumphii*, Bl. 1, lateral view of receptacle; 2, base of receptacle; 3, apex of receptacle; 4, vertical section through receptacle: *of natural size.*

PLATE 84^{t}.—5, male flower; 6, sessile gall flower; 7, fertile female achene: *enlarged.*

66. FICUS RELIGIOSA, *Linn. Hort. Cliff.* 471; *Sp. Plant. ed.* 2. 1514; *Bl. Bijd.* 436; *Roxb. Fl. Ind.* iii. 547; *Wight Ic.* 1967; *Bedd. Fl. Sylv. t.* 314; *Brandis For. Flora* 415; *Kurz For. Flora Brit. Burm.* ii. 448.—*F. affinior*, Griff. Posth. Pap. pt. 4. 392. t. 553.—*Urost. religiosum*, Gasp. Ric. 82. tab. 7. fig. 1; Miq. Fl. Ind. Bat. i. pt. 2. 333, t. 23; Miq. in Lond. Journ. Bot. vi. 563; Dalz. and Gibs. Fl. Bomb. 241.—*Urostig. affine*, Miq. in Lond. Journ. Bot. vi. 564.—*Arealu*, Rheede Hort. Malab. i. 47. t. 27.—*Fic. Malabar*, &c., Pluk. Phyt. 144. t. 178. fig. 2; Wall. Cat. 4487A, B, C, D, and E.

A large, glabrous, usually epiphytal tree; leaves coriaceous, upper surface shining, lower minutely tuberculate when dry, long-petiolate, ovate-rotund, narrowed upwards and the apex produced into a linear-lanceolate tail, edges entire, undulate; base broad, rounded to truncate, sometimes a little narrowed at the union with the petiole, occasionally emarginate, or in young leaves even cordate, from 5- to 7- nerved; lateral primary nerves about 8 pairs, reticulations fine, distinct; length of blade from 4·5 to 7 inches, of which the apical tail forms about a third, breadth 3 to 4·5 in.; petioles from 3 to 4 in. long, slender; stipules minute ovate-acute; receptacles in pairs, axillary, sessile, smooth, depressed spheroidal, when ripe dark purple, ·5 in. across, with 3 broad, spreading, coriaceous basal bracts; male flowers very few, and only near the mouth of some receptacles (absent in many), sessile, the perianth of 3 broadly ovate pieces; anther single, ovate-rotund, its filament short; gall and fertile flowers sessile or pedicillate, the perianth of 5 lanceolate pieces, style short, lateral, stigma rounded; the galls much more numerous than the fertile females, and many of them without perianth.

Wild in the sub-Himalayan forests; in Bengal and in Central India. Universally planted in all parts of India and Ceylon, less frequently in Burmah, and rarely in the Malayan regions. This is the sacred Bo-tree under which, according to the legend, Sakyamuni, the Buddha of the current cycle, became incarnate. It is especially sacred to Buddhists and Hindoos, to whom it is an object of veneration, and even of worship.

I reduce *F. affinior*, Griff. here with some hesitation: for Griffith's figure of *affinior* shows a slight difference from the ordinary type of *religiosa* in the venation of the leaves. It agrees however in this respect no better with *Rumphii*, which is the species nearest to *religiosa*.

PLATE 67A.—Fruiting-branch of *F. religiosa*, Linn. 1 & 2, base and apex of a receptacle: *of natural size.*

PLATE 84^{u}.—3, male flower; 4 & 5, sessile and pedicillate female flowers; 6 pedicillate gall flower without perianth: *all enlarged.*

67. FICUS ARNOTTIANA, *Miq. Ann. Mus. Lugd. Bat.* iii. 287.—*Urost. Arnottianum*, Miq. Lond. Journ. Bot. vi. 564.—*Urost. Courtallense*, Miq. in Lond. Journ Bot. vi. 564.—*F. cordifolia*, Dalz. and Gibs. (not of Bl. or Roxb.) Flora of Bomb. 242; Thwaites Enum. Pl. Ceyl. 264; C. P. 2856; Wall. Cat. 4485A and C.

A tree or shrub, glabrous in all its parts; leaves long-petiolate, sub-coriaceous, broadly ovate, narrowed upwards to the shortly caudate-acuminate apex; margins entire; base from truncate-emarginate to deeply cordate, never narrowed to the petiole, 7-nerved; lateral primary nerves 5 to 7 pairs, reticulations lucid, minute; length of blade 3 to 8 in., of petiole 2 to 6 in.; stipules ovate-lanceolate, ·6 to 1 in. long, caducous, reddish-brown when dried; receptacles mostly from the axils of fallen leaves, in pairs or in clusters from tubercles, sessile or short pedunculate, depressed-globular, smooth; when ripe purple with greenish dots, ·25 to ·4 in. across; basal bracts 3, brown, membranous; peduncles when present from ·1 in. to ·2 in. long; male flowers few, near the mouth of the receptacles, sessile, the perianth of 3 loose, inflated, broadly acuminate pieces which are much larger than the single small, ovate-rotund, subsessile anther; gall and fertile female flowers undistinguishable except by contents of ovary, sessile or pedicillate, the perianth gamophyllous, lax, toothed at the apex, completely investing the ovary, style elongate, stigma flat.

Western and Southern India and Ceylon; in rocky places.

VAR. COURTALLENSIS.

Leaves smaller and less cordate at the base than in the typical form.

Hills of Southern India.

Hamilton and Wallich referred this to *F. populifolia*, Vahl., an African species which it undoubtedly resembles, but which has leaves almost reniform with the receptacles on longer peduncles.

Wallich distributed three species under the name *populifolia* and the number 4485. These are as follows in the Linnæan Society's set:—

4485 A. is the same as Thwaites C. P. 2856, and is *F. Arnottiana.*

B is, in my opinion, *E. Rumphii*, Bl.

F

C is *F. Arnottiana.*

D is *F. infectoria*, Roxb., *var. Lambertiana.*

Plate 68.—Fruiting-twig of *F. Arnottiana*, Miq. Separate figure of base and apex of receptacle. B.—Var. *Courtallensis : all of natural size.*

Plate 84^{v}.—1, male flower; 2, pedicillate female flower; 3, ovary of gall removed from its perianth : *all enlarged.*

68. Ficus mooniana, *King.—Urost. Wightianum.*, Miq., *var. B. majus*, Thwaites Enum. Pl. Ceyl. 265.

A large tree; leaves sub-coriaceous, elliptic or ovate-oblong, apex shortly and abruptly cuspidate, margin entire, minutely undulate; base rounded or slightly narrowed, 3-nerved, not cordate; glabrous, with very prominent minute reticulations; lateral primary veins 10 to 15 pairs; length of blade 4·5 to 6·5 in.; petioles about 1·25 in.; stipules about ·3 in., puberulous; receptacles crowded below the extremities of the branches, solitary or in pairs, axillary, but chiefly in the axils of fallen leaves, globular, about ·3 in. (sometimes ·5 in.) across, punctate, on peduncles ·5 in. long; male flowers few and only near the mouth of the receptacles, sessile, the perianth of 3 lanceolate pieces which do not quite cover the single stamen; anther ovate-apiculate, on a filament as long as itself; gall and fertile female flowers sessile or pedicillate, the perianth gamophyllous, 4-toothed, shorter than the ovary; gall ovary ovoid; fertile achene broadly triangular ovoid.

Ceylon.

This was considered by the late Dr. Thwaites to be a variety of *F. Wightiana*, Wall., but it is so different from that or any other form of *infectoria* as to appear to deserve specific rank. The nerves of the leaves are straighter, more numerous, and form a wider angle with the midrib, and the fruit is on much longer peduncles than is the case in *F. Wightiana.*

Plate 69.—Fruiting-branch of *F. Mooniana*, King. 1, apex; 2, base of a receptacle: *of natural size.*

Plate 84^{w}.—4, male flower; 5, sessile fertile female flower; 6, achene of the same; 7, pedicillate gall flower : *all enlarged.*

69. Ficus tjakela, *Burm. Fl. Ind.* 227.—*Tsjakela*, Rheede Hort. Malab. iii. 87. t. 64.—*F. Tjakela Burm.*, Miq. in Ann. Mus. Lugd. Bat. iii. 287.—*F. venosa*, Ait. Hort. Kew ed. 1. iii. 451 (not of Willd. Hort Berol. 36. t. 36); Poir. Encyc. Method. Supp. ii. 657; Ham. in Trans. Linn. Soc. xv. 151.—*F. infectoria*, Willd. (non Roxb.) Spec. Pl. iv. 1137; Ait. Hort. Kew ed. 2. v. 485.—*Urost. Tjakela*, Miq. Lond. Journ. Bot. vi. 567.—*Urost. Ceylonese*, Miq. id. 570.—*F. caulobotrya*, Miq. Ann. Mus. Lugd. Bat. iii. 287 (*excl. syn. caulocarpa*).—*Urost. caulobotrya*, Miq. Lond. Journ. Bot. vi. 568; Wall. Cat. 4519A and B; Thwaites, C. P. 2931, 3083.

A very tall tree without aerial roots; all parts glabrous; leaves coriaceous, very glossy above, long petiolate, oval to ovate, shortly and abruptly acuminate, edges entire, slightly undulate; base broad, rounded, or sub-truncate, rarely narrowed, 3- to 5-nerved; lateral primary nerves 7 to 10 pairs, slightly prominent on both surfaces; length of blade 5 in. to 7·5 in.; petioles 1·75 to 2·5 in., slender; stipules small, ovate-lanceolate, ·5 in. long; leaf-scales of young branches large, linear-lanceolate, flaccid, caducous, 3 to 5 in. long; receptacles in clusters of 2 to 6 on very short, crowded tubercles (aborted branchlets), borne partly in the axils of the leaves, but most frequently in the axils of the scars of fallen leaves, sessile, rarely very shortly pedunculate, depressed-globular, whitish-yellow and dotted when ripe, ·2 in. across, with 3 broad, deeply-bifid bracts at the base; male flowers few and only near the mouth of the receptacle, sessile, the perianth of 3 ovate pieces, shorter than the single stamen; anther ovate, on a filament about as long as itself; gall and fertile female flowers alike except as regards contents of ovary, the perianth of 3 or 4 pieces, which quickly separate from the ovary; fertile achene obovate, the style elongate, the stigma cylindrical.

Southern and Western India and Ceylon, from the plains to 4,000 ft.

This is a very distinct and beautiful species. It is allied to *F. infectoria*, Roxb., with which it has been sadly mixed up by authors. But it is at once distinguishable from *infectoria* by its minute receptacles in clusters of 4 to 6, and in the herbarium by the dark greenish-gray colour of its leaves, the upper surfaces of which are very smooth and glistening. The large, membranous, caducous, flaccid leaf-scales of this species are in shape very like the stipules of *F. elastica*, but they are much more fugacious.

A small form of this has been collected by Mr. J. S. Gamble, Conservator of Forests in the Cuddapah district, of which the leaves are only about 3·5 in. long.

Wight's specimen No. 26 in herbarium at Utrecht has short pedunculate receptacles.

PLATE 70.—Fruiting-branch of *F. tjakela*, Burm. Separate small figures of base and apex of receptacles and of stipules. *N.B.—The receptacles have been drawn slightly too small; the leaves and stipules are of natural size.*

PLATE 84^x.—1, male flower; 2, fertile female flower: *both enlarged.*

70. FICUS INSIGNIS, *Kurz For. Flora Brit. Burm.* ii. 447.

A tree, the young branches at first tomentose, ultimately pubescent or glabrous; leaves long-petiolate, glabrous, glossy above, dull below, very coriaceous, elliptic or ovate-elliptic, slightly inequilateral, with a very short, abrupt, blunt apiculus; edges entire, slightly revolute and undulate; base slightly narrowed, obscurely 3- to 5-nerved; lateral primary nerves 10 to 12 pairs, reticulations obscure; length of blade 4·5 to 7 in., breadth 2·25 to 4 in.; petioles jointed to the blade, 2 to 2·5 in. long; stipules small, very broadly ovate, tomentose; receptacles crowded towards the apices of the branches, from the axils of the leaves or of the scars of fallen leaves on short tomentose (1 line long) peduncles, globular, apex mammillate, when ripe greyish-white with pink dots and densely tomentose except the apical mammilla which is glabrous; basal bracts 3, small, ovate-rotund, glabrous, scarious; male flowers few and only near mouth of receptacles, the perianth gamophyllous, toothed, shorter than the filament of the single stamen; anther broad, thick; gall and fertile female flowers with gamophyllous 3- or 4-toothed perianth, shorter than the ovary; gall ovary ovoid; fertile achene triangular, ovate, minutely tuberculate, style elongate, stigma cylindric.

Burmah,—*Kurz.*

This tree has been collected only by Kurz. It comes near to *F. geniculata*, but is distinguished by its much more coriaceous leaves, and by its tomentose stipules and receptacles.

PLATE 71.—Fruiting-branch of *F. insignis*, Kurz. Separate figures of receptacles as seen from the side, base, and apex, and of stipules: *all of natural size.*

PLATE 84^{y}.—1, male flower ; 2, gall flower ; 3, fertile female achene, the perianth having been removed : *all enlarged.*

71. FICUS SUPERBA, *Miq. Ann. Mus. Lugd. Bat.* iii. 287.—*Urost. superbum*, Miq. Pl. Jungh. 46 ; Fl. Ind. Bat. i. pt. 2. 334.—*Urost. accidens*, Miq. Fl. Ind. Bat. i. pt. 2. 347 (*fide* Miquel).

A tree, all parts glabrous except the stipules, receptacles, and their peduncles; leaves membranous, long-petiolate, crowded about the apices of the branches, broadly elliptic to obovate-elliptic, apex with an abrupt, short, blunt point; edges entire, slightly thickened and minutely undulate; base rounded or slighly narrowed, with 2 prominent and 2 minute basal nerves; primary lateral nerves 6 to 8 pairs, straight, prominent; length of blade 5 to 6 in , of petioles about 3 in.; stipules short, ovate, covered with short yellowish tomentum, ·5 in. long ; receptacles from the axils of the scars of fallen leaves, in pairs, broadly ovoid, sub turbinate, minutely scurfy and puberulous when young, glabrous when adult, about ·5 in. across, on shortly pubescent ·25 in. long peduncles which bear 3 caducous bracts near their base; male flowers very few and only near mouth of receptacle, on thin pedicels, the perianth of 3 ovate-rotund pieces, shorter than the stamen; anther broad, its margins sinuate, filament very thick, longer than the anther; gall and fertile female flowers with perianth of 3 short obovate pieces, the style lateral, elongate, stigma sub-capitate; fertile achene broadly obovate; gall ovary elongate-ovate.

Mountains of Western Java.

I have seen specimens of this only in the herbaria of Leiden, Kew, and Calcutta.

This comes near to *F. infectoria*, Roxb., var. *geniculata*, but is distinguished from that by its tomentose stipules and large receptacles.

PLATE 72.—Fruiting-branch of *F. superba*, Miq. 1, receptacle ; 2, ditto, showing apex ; 3, ditto, lateral view; 4, stipules: *all of natural size.*

PLATE 84^{z}.—5, male flower ; 6 gall flower ; 7 fertile female flower: *all enlarged.*

72. FICUS TSIELA, *Roxb. Fl. Ind.* iii. 549 ; *Rheede Hort. Malab.* iii. *t.* 63 ; *Ham. in Linn. Trans.* xv. 149 (*cum syn.*); *Wight Ic. t.* 668 ; *Miq. in Ann. Mus. Lugd. Bat.* iii. 286 ; *Bedd. Fl. Sylvat.* ii. 314.—*F. indica, Linn., var. B.*, Sp. Plant. ed. 2. 1514.—*F. Indica*, Willd. Sp. Pl. iv. 1146.—*Urost. pseudo-tjiela*, Miq. in Lond. Journ. Bot. vi. 566 ; Ann. Mus. Lugd. Bat. iii. 286 ; Dalz. and Gibs. Fl. Bomb. 241.—*F. Benjamina*, Wall. Cat. 4503B and C.—*Urost. pseudo-Benjamina*, Miq. in Lond. Journ. Bot. vi. 566 ; Ann. Mus. Lugd. Bat. iii. 286 ; Thwaites C. P. 2218, 2537.

A large spreading tree without aerial roots, all parts glabrous; leaves coriaceous, broadly ovate or ovate-lanceolate, apex acute, or broadly bluntly and shortly cuspidate; edges entire, with a thick marginal nerve; base narrowed or rounded, 3-nerved; main primary nerves indistinct (until the leaf is dry), from 8 to 10 pairs ; length of blade 2 to 4·5 in. ; petioles 1·3 to 2 in. long; stipules ovate-acuminate, ·4 in. to 1 in. long; receptacles crowded at the ends of the branches, in the axils of leaves or of leaf-scars, sessile, globular; when ripe purple, smooth, about ·5 in. across, basal bracts 3, minute, broadly ovate, scarious; male flowers few, sessile, the perianth of 3 ovate-acuminate pieces, longer than the single stamen ; anther broadly ovate, on a thick filament longer than itself ; gall flowers sessile or pedicillate; fertile females mostly sessile; the perianth both of galls and fertile females of 3 ovate pieces, shorter than the achene; both fertile and gall achenes ovate-reniform, the fertile broader than the gall, style in both long, stigma cylindric.

Southern India, especially in the drier parts; Northern part of Ceylon. Never wild in Northern India; but occasionally planted, as it makes a striking avenue tree. The bark is of a greenish-white colour, and is smooth.

There has been considerable misunderstanding about the synonomy of this species—a misunderstanding that appears to have originated in the confusion of Rheede's *tsiela* (*Hort. Malab.* iii. 63), which is an excellent representation of *F. tsiela*, Roxb., with the *Varinga latifolia* of Rumphius (*Herb. Amb.* iii. 134. t. 84). These two figures were quoted in Linnæus' *Spec. Plant.* ed. 2. 1514, under *F. Indica*, var. B,—a confusion which was continued by Willdenow. Roxburgh recognised the distinctness of Rheede's plant, and adopted as its specific name the vernacular name *tsiela*, already published by Rheede; but he made no reference to *F. Indica*, Willd. Wallich issued under the name *F. tsiela* as No. 4520 of his Catalogue a plant which is really a narrow-leaved form of *F. infectoria*, Roxb. Typicial *F. tsiela*, Roxb. he issued under the name *F. Benjamina* as No. 4503 of his Catalogue; but unfortunately he mixed up with it pieces of true *F. Benjamina*, Linn. and of *retusa*, Linn., so that it throws little light on the matter to quote his numbers. All the specimens (which I have seen) issued as 4503, letter C, consist, however, of a sport of *tsiela* with small leaves and greatly elongated petioles, which is not uncommon on old trees. This sport forms curious tufts on the ends of some of the branches and can be seen growing in abundance in Madras.

Thwaites issued *F. tsiela*, Roxb. as C. P. 2218 and 2537. But his 2220, issued also as *tsiela* by him, is a hitherto undescribed species, which, in honour of the present distinguished Director of the Botanic Garden in Ceylon, I have called *F. Trimeni.*

Plate 73.—Fruiting-branch of *F. tsiela*, Roxb. Separate figures of apex and base of receptacle and of stipules; and of leaf of the sport mentioned in the text: *all of natural size.*

Plate 84^{22}.—1, male flower, 2, pedicillate gall flower; 3, fertile female flower: *all enlarged.*

Plate 74.—*F. tsiela*, Roxb. Fruiting-branch of the form named *F. pseudo-tsiela* by Miquel. 1 & 2, apex; 3, base of receptacle: *all of natural size.*

73 Ficus infectoria, *Roxb.* (*non Wilid.*) *Fl. Ind.* iii. 550 (*excl. syn. Rheede*); *Wight Ic. t.* 665; *Dalz. and Gibs. Fl. Bomb.* 241; *Bedd. Fl. Sylvat.* ii. 222 (*excl. syn. tjakela and Ceylonense*); *Brandis For. Flora*, 414 (*excl. syn. venosa and Tjakela*); *Kurz For. Flora Brit. Burm.* ii. 446.—*Urost. infectoria*, Miq. Fl. Ind. Bat. i. pt. 2. 339.—*Urost. timorense*, Miq. (non Decne.) Ann. Mus. Lugd. Bat. iii. 286; Lond. Journ. Bot. vi. 569; Fl. Ind. Bat. i. pt. 2. 343.—*F. lacor*, Ham. Linn. Trans. xv. 150.—*Urost. leucocarpum*, Miq. Lond. Journ. Bot. vi. 576; Ann. Mus. Lugd. Bat. iii. 286.—*F. terminalioides*, Griff. Posth. Pap. pt. 4. t. 550.—*F. lucescens*, Bl. Bijd. 444.—*Urost. lucescens*, Miq. Fl. Ind. Bat. i. pt. 2. 339; Wall. Cat.—*F. venosa*, 4519D and F; 4529A.—*F. lacor*; 4520.—*F. tjiela* (*not of Roxb.*); Zoll. Cat. 3420.

A deciduous, moderately-sized low tree, all parts glabrous; leaves membranous, on rather long, slender petioles, oblong-ovate or ovate, the apex rather abruptly shortly-acuminate, edges entire, sub-undulate; base usually rounded and slightly emarginate or sub-cordate, sometimes narrowed or acute, 3-nerved; lateral main nerves 5 to 7, not very prominent; length of blade 3·5 to 5 in.; petioles 1·5 to 2 in. long, sometimes indistinctly jointed at their union with the blade; stipules about ·5 in. long, broadly ovate-acute, pubescent externally; receptacles axillary, in pairs, sessile, globular, when ripe ·25 in. across, whitish, flushed with red and dotted; basal bracts 3, ovate-rotund, minute; male flowers few, sessile, near the mouth of the receptacles; stamen single, the anther broadly ovate, filament short; perianth of four or five linear pieces; gall flowers and fertile female flowers with perianth of 3 or 4 pieces like those of the male, the latter often sessile; style of fertile female long, of gall flower short, stigma elongate.

On the plains of India, Burmah, and the Malayan region. Not very common anywhere wild, but frequently planted near villages.

This is a truly deciduous species. Towards the end of the cold season it is entirely leafless. But it remains so for only a few days, for the leaf-buds quickly begin to swell, and as they expand they are seen to be covered by remarkably large (1·5 to 2·5 in. long), membranous, linear-lanceolate, flaccid, pubescent leaf-scales. These scales grow as the leaves grow, but fall off before the latter are full-grown, and leave no trace of themselves. They are rarely seen in herbaria. Similar scales occur in *Bengalensis*, *tjakela*, and other species.

There has been very great confusion both as to plants and as to synonyms in connection with this species, and I shall attempt to disentangle it. In the confusion three plants are concerned. Rheede (in *Hort. Malab.* iii. 87 and t. 64) described and figured under its vernacular name *tsjakela* a species of *Ficus* common in S.W. India. Rheede's figure is an excellent likeness and, if one has seen the tree, it is impossible to doubt what Rheede meant by *tsjakela*. But by one who has not seen the *tsjakela* growing, Rheede's figure might be supposed to represent the *pakur* of Bengal. Rheede's *tsjakela* was named by Burmann (*Fl. Ind.* 227) *Ficus tjakela.* In the first edition of the *Hortus Kewensis* iii. 451, the name was changed to *F. venosa*, Ait., and in the Calcutta copy of the *Hort. Malab.* the name *venosa* has been written by Solander's own hand. In his *Hort. Berol.* 36. t. 36, Willdenow described and figured a plant which he imagined to be *venosa*, Ait., but which is really the totally different plant which Poiret in *Encyc. Method. Supp.* ii. 654 named *F. leucantatoma.* Willdenow discovered his blunder, but instead of correcting it, he (in his edition of *Linnæus Spec. Plant.* iv. 1136-7) kept the name *venosa* for the plant which he had wrongly figured and described as *venosa*, Ait., and gave the new name *infectoria* to the true *venosa*, Ait. of the first edition of the *Hort. Kewensis.* The blunder of Willdenow was accepted by the editor of the second edition of the *Hort. Kew.*, and in that work the *F. tjakela* of Rheede and Burmann appears as *F. infectoria*, Willd. Buchanan Hamilton, in his *Commentary on the Hortus Malabaricus* (*Linn. Trans.* xv. 151), pointed out Willdenow's mistake and described, under the name *F. venosa*, Poir., Rheede's *tsjakela.* But Roxburgh perpetuated Willdenow's blunder in his *Hortus Bengalensis*, for, mistaking no doubt Rheede's figure of *tsjakela* for a figure of the Bengali *pakur*, he applied the name *infectoria*, Willd. to the *pakur*, and in his *Fl. Indica* (iii. 551) he quoted Rheede's figure of *tsjakela* and Willdenow's name *infectoria* and attached these to a description of the *pakur* of the Bengalis. The *F. infectoria* of Willdenow is therefore the *tsjakela* of Rheede and of the natives of Malabar, while the *F. infectoria* of Roxb. is the *pakur* of the Bengali. In the meantime Buchanan Hamilton, in *Linn. Trans.* xv. 150, had described and named the *pakur* of the Bengalis under the name of *F. lacor*, Ham. Specimens of *F. lacor* named by Hamilton's own hand were issued as 4529A (not B) of Wall. Cat., and can still be consulted. Unfortunately Hamilton described as the normal receptacle of this tree (which is glabrous) some receptacles which are insect-attacked and abnormally hairy (not an uncommon occurrence in some of the Indian species of *Ficus*). Hamilton's specimens of *lacor* are, however, unmistakeably specimens of one of the forms of *pakur* (*F. infectoria*, Roxb.). Deceived by their hairy receptacles, Miquel re-named Hamilton's specimens *Urost. leucocarpum*, and described the receptacles as covered with white hair. But unfortunately he attached his name *Urost. leucocarpum* to specimens of a plant near, if not identical with *F. Chittagonga*, Hook. fil. and Th. MS. (= *F. glomerata*, Roxb., var.), and thus introduced a further element of confusion. The oldest name of this species is thus *F. lacor*, Ham., the specific name being doubtless a corruption of the word *pakur*, which is still in Bengal the vernacular name of this tree. There can be no mistaking Hamilton's specimens as those of a common form of *pakur*. But Roxburgh's name *infectoria*, although originally applied by him in error to a different species from that to which Willdenow first gave it, has been so long identified with the true *pakur* of Bengal, that I think it better to keep it up than to restore the rather barbarous name *lacor* originally given by Hamilton.

There is confusion also in the plants issued by Wall. under the No. 4519A to F, and under the general name *F. venosa*, Ait. I have examined the Wallichian sheets in possession of the Linnæan Society and in the Herbaria at Kew and Calcutta, and also those in M. De Candolle's herbarium. The plants indicated by the six letters are not equally represented in all these herbaria; but where they are represented, their names are as follows:—

Wall. Cat. 4519A.—"*F. infectoria*, Herb. Wight" in all four herbaria is *F. tjakela*, Burm.

Wall. Cat. 4519B.—"*F. venosa*, Ait." is also *F. tjakela*, Burm. It is absent at Kew.

" " C is absent in all four herbaria.

" " D.—"*F. infectoria*, Hb. Ham." is true *F. infectoria* Roxb. (absent at Kew).

" " E is in all four herbaria fragmentary and indeterminable.

" " F is unmistakeably *F. infectoria*, Roxb. (absent at Kew).

In *Ann. Mus. Lugd. Bat.* iii. 286, Miquel reduces here *F. lucescens*, Bl. Bijd. 444, of which I have seen no authentic specimen. Blume's description is too meagre and vague to be relied on, and I therefore quote this synonym doubtfully. Miquel also reduces here his own *Urost. ægeirophylla*, which I have satisfied myself by examination of his types to be the same as his *F. Lambertiana*, Miq. Griffith's specimen in the Calcutta Herbarium of his *F. affinior* is true *infectoria*, but his figure and description of *affinior* (*Notulæ* 392. t. 553) agree better with *F. Rumphii*, *Bl.* or F. *religiosa*, Linn. Miquel's species *F. Timorensis* is founded on a single specimen from Timor in the Kew Herbarium, which I have examined, and which appears to me in no way different from typical *F. infectoria*, Roxb. There are no specimens of *F. Timorensis*, Miq. in the herbaria at Leiden or Utrecht.

As might be expected in a plant with such a wide distribution, a considerable variety of forms occur. These can be pretty satisfactorily arranged as geographical varieties as follows:—

TYPICAL INFECTORIA: bases of leaves emarginate or sub-cordate or slightly narrowed; receptacles sessile.

VAR. 2. LAMBERTIANA.

Ficus Lambertiana, Miq. in Ann. Mus. Lugd. Bat. iii. 286; Dalz. and Gibs Fl. Bomb. 241.—*Urost. Lambertianum*, Miq. in Lond. Journ. Bot. vi. 565.—*F. rigida*, Ham. (non Miq.) in Wall. Cat. 4527, 4585B.—*F. punctata*, Hb. Heyne, Wall. Cat. 4569.—*Urost. ægeirophyllum*, Miq. in Lond. Journ. Bot. vi. 565.—*Urost. Wightianum*, Thw. (non Wall.) Enum. Pl. Ceyl. (in part); C. P. 2223.—*Urost. perseæfolium*, Miq. Lond. Journ. Bot. vi. 567.

Leaves distinctly coriaceous, their bases broad, rounded, emarginate or sub-cordate, rarely narrowed; receptacles ·3 to ·4 in. across, on pubescent pedicels from ·2 to ·3 in. long.

The drier parts of Western Peninsular India and Ceylon, the Deccan, Guzerat, on Mount Aboo, and sparingly on the Siwaliks in Northern India; also in Chota Nagpore.

VAR. 3. WIGHTIANA.

F. Wightiana, Wall. Cat. 4540; Miq. in Ann. Mus. Lugd. Bat. iii. 286; Bedd. Fl. Sylvat. ii. 222.—*Urost. Wightianum*, Miq. in Lond. Journ Bot. vi. 566.

Leaves smaller than in the other varieties (often only 2·5 in. long), narrowed at the base; receptacles large in proportion to the leaves, on glabrous or pubescent peduncles about ·2 in. long.

On the southern edge of the Gangetic plain, the Nilgiris, the Deccan, and the Western Ghats.

VAR. 4. FORBESII.

Leaves sub-coriaceous, ovate or elliptic, with narrowed or rounded base and shortly acuminate apex; primary lateral nerves very prominent underneath, yellow and shining when dry; petioles ·75 in. to 1 in. long; receptacles sessile.

Sumatra, at an elevation of 5,000 ft.—*H. O. Forbes*, 2701; Celebes, Timor,—*Teysmann*.

This dries of a bright brown colour and has more numerous and more prominent nerves than any of the other varieties. Mr. Forbes describes it as an immense tree.

VAR. 5. CAULOCARPA.

Urostigma caulocarpum, Miq. in Lond. Journ Bot. vi. 568; Journ. Bot. Neerland, 234 (excl. *F. caulocarpa*, Miq. in Ann. Mus. Lugd. Bat. iii. 235, 297, which is *F. Miquelii*, King).

Leaves narrowly oblong, apex suddenly, shortly and bluntly cuspidate, base narrowed, lateral main nerves about 12 pairs; length of blade 7 to 8 in.; receptacles small, crowded in the axils of the scars of fallen leaves; stipules and basal bracts puberulous.

Philippines,—*Cuming*, 1930; Borneo,—*Beccari*, P. B. 3399.

This form approaches *F. tjakela*, Burm. by its small receptacles crowded in the axils of the scars of fallen leaves. It is quite possible that this is the plant which Miquel described (*Lond. Journ. Bot.* vi. 569) as *Urost. Timorense*, of which there is no specimen in the herbaria at Leiden, or Utrecht where Miquel's materials chiefly are. There is a small fragment at Kew bearing this name which agrees fairly well with this form. But the name is already occupied by a species described by Decaisne in *N. Ann. Mus.* iii. 495, and Miquel himself described another species (a *Covellia*) under this name in *Ann. Mus. Lugd. Bat.* iii. 235, 297.

Plate 75.—Fruiting-branch of *F. infectoria*, Roxb., typical form. Separate figures of (2) base and (3) apex of receptacles and (4) of stipules, and (1) a leaf of a different shape: *all enlarged.* *all of natural size.* Plate 84^{y2}.—4, male flower; 5, gall flower; 6, fertile female:

Plate 76.—Fruiting-branch of *F. infectoria*, Roxb., var. *Lambertiana.* Two separate figures of leaves to show varieties in form: *all of natural size.* Separate views of apex and base of receptacle : *slightly enlarged.*

Plate 77.—Two fruiting-branches of *F. infectoria*, Roxb., var. *Wightiana*, to show two different forms ; separate figures of receptacles and stipules : *all of natural size.*

Plate 78.—Fruiting-branch of *F. infectoria*, Roxb., var. *Forbesii.* 1, receptacle seen from above; 2, ditto seen from below ; 3, stipules : *all of natural size.*

Plate 79.—Fruiting-branch of *F. infectoria*, Roxb., var. *caulocarpa : natural size.* 1, stipule; 2, lateral view of receptacle ; 3, basal view of the same ; 4, one of the basal bracts : *Nos.* 1 *to* 4 *are enlarged.*

In the Kew Herbarium there are two specimens in young leaf from the Philippines (Cuming, 1978) which have long, flaccid, fugacious scales covering the expanding leaf-buds, very like those of *F. tjakela*, Burm. These two specimens form the types of Miquel's *F. stipulosa*, but I believe them to be nothing but young shoots of this variety.

74. Ficus geniculata, *Kurz For. Flora Brit. Burm.* ii. 447.

A large tree; all parts glabrous except the pubescent stipules; leaves sub-coriaceous, broadly elliptic or ovate-rotund, shortly and abruptly acuminate, the edges sub-undulate; the base rounded or narrowed, sometimes emarginate, 3-nerved; lateral primary nerves nearly at a right angle to the midrib, from 8 to 12 pairs; secondary nerves and reticulations distinct on both surfaces; length of blade 4 to 7 in., breadth 2·5 to 4 in.; petioles 2·5 to 4 in. long, separating from the blade when dry; stipules about ·35 in. long, broadly ovate, pubescent; receptacles crowded, shortly pedunculate or sessile, in groups of 2 to 4 in the axils of scars of fallen leaves, depressed-globular, ·25 in. to ·35 in. across; when ripe reddish with dots; basal bracts 3, broadly ovate; male flowers near the mouth of the receptacles, rather numerous, the perianth gamophyllous, barely covering the single stamen; anther broad, rotund-ovate, on a short filament; gall and fertile female flowers with similar perianth of 2 or 3 lanceolate pieces; gall flower with short, and fertile female with a long style.

Tropical zone in the Sikkim Himalaya, Assam, Chittagong, Burmah, and Malaya.

This is closely allied to *infectoria*, with which I at one time thought of uniting it; but I am now convinced that it is a separable species. Its leaves are always more rotund than those of *infectoria*, its petioles longer, and its male flowers have a gamophyllous perianth.

Plate 80.—*F. geniculata*, Kurz. Branch with young receptacles, separate figures of base and apex of receptacles, basal bracts, and stipules: *all of natural size.*

Plate 84^{x2}.—1, unexpanded male flower; 2, expanded male flower; 3, anther removed from perianth; 4, gall flower; 5, fertile female flower: *all enlarged.*

Series III.—Leaves coriaceous, stamens sometimes 2.

75. Ficus callosa, *Willd. Ait. Acad. Berol*, 1798, *p.* 102, *tab.* 4; *Miq. in Ann. Mus. Lugd. Bat.* iii. 295; *Kurz For. Flora Brit. Burm.* ii. 454.—*F. scleroptera*, Miq. Pl. Jungh. 63; Fl. Ind. Bat. i. pt. 2. 314.—*F. cinerascens*, Thw. Enum. Pl. Ceyl. 266; Thwaites, C. P. 2562.—*F. artocarpifolia*, Roxb. *MSS.*

A large tree; the young branches canescent, verrucose; leaves of a rigid, hard. coriaceous texture, petiolate, elliptic, or oval; the apex rounded or with a short, broad, blunt acumen;

edges entire, slightly recurved; base broad, rounded, sometimes slightly narrowed to the petiole, 3- to 5-nerved; lateral primary nerves 5 to 12 pairs, thin, but prominent below, as are the intermediate nerves and reticulations; under surface pale, minutely papillose, pubescent when young, ultimately glabrous but sub-scabrid; upper surface smooth, shining, and hard; length of blade 5 to 8 inches (in barren shoots often 12 inches or more); petioles 1·2 in. to 1·75 in. long; stipules ovate-lanceolate, ·4 in. to ·5 in. long, pubescent; receptacles pedunculate, solitary, axillary, pubescent-scabrid, sub-globular, very slightly depressed at the apex, and contracted at the base into a short stalk at the junction of which with the peduncle are 3 broadly-ovate pubescent bracts; when ripe yellow and about 1 in. across; peduncle proper about ·8 in. long, pubescent-scabrid; the flowers intermixed with numerous ovate-lanceolate bracteoles which rise from the interior of the receptacle along with them; male flowers rather numerous, scattered, pedicillate, monandrous, or occasionally diandrous, the perianth of 3 spathulate pieces; anther small, ovate, on a short thin filament; perianth of gall flowers and fertile females similar, gamophyllous below, deeply divided above into 3 or 4 broadly lanceolate segments; style elongate; stigma deeply bifid; ripe achene obovoid.

Southern Peninsular India and Ceylon, Burmah, the Andaman Islands, Java, and probably in other parts of the Malayan Archipelago.

Some of the numerous bracteoles which lie between the flowers are often with difficulty distinguished from the perianth proper.

I follow Miquel in adopting Willdenow's name *callosa* for the plant named *scleroptera* by Miquel himself and *cinerascens* by Thwaites. But I think it rather doubtful whether Willdenow's description of his *callosa* really refers to this plant.

PLATE 85.—*F. callosa*, Willd.—Branch with mature receptacles: *of natural size.*

PLATE 84^{v2}.—1 & 2, monandrous and diandrous male flowers; 3, sessile gall flower; 4, pedicillate fertile female; 5, fertile achene: *all enlarged.*

76. FICUS VASCULOSA, *Wall. Cat.* 4482; *Miq. in Lond. Journ. Bot.* vii. 454; *Pl. Jungh.* 61; *Fl Ind. Bat.* i. *pt.* 2. 315.—*F. Championi*, Benth. in Kew Journ. Bot. vi. 76; Fl. Hong-Kong, 328.

A tree; all parts quite glabrous; the leaves of a pale green when dry, coriaceous, petiolate, elliptic or obovate-oblong, with an obtuse or bluntly and shortly acuminate apex and entire edges; gradually narrowed to the acute or cuneate, obscurely 3-nerved, base; lateral primary nerves 6 to 12 pairs, nearly transverse, thin but prominent below, reticulations rather distinct; both surfaces perfectly glabrous and shining, and of a pale colour; length of blade 2 to 3 in.; petioles ·5 in. to ·7 in. long; stipules ·25 in. long, ovate-acute; receptacles pedunculate, in pairs, axillary, globular, glabrous, minutely tuberculate, constricted and minutely 3-bracteate at the base, pale yellow when ripe and from ·2 in. to ·5 in. across; pedicels slender, ·4 in. to ·6 in. long; male flowers few and only near the mouth of the receptacle, pedicillate, diandrous, the perianth of 4 ovate or obovate pieces; fertile female and gall flowers alike except as regards contents of ovary, sessile or pedicillate; the perianth gamophyllous, the mouth 4-toothed; ovary obovoid; style lateral, elongate; stigma 2-armed.

Tavoy (in Burmah), Malayan Peninsula, Banka, Java, Penang, Hong-Kong, up to 2,500 ft.

Mr. Bentham separates the Hong-Kong plant under the name *F. Championi*, but I cannot find that it differs from Wallich's type specimens.

Plate 86.—*F. vasculosa*, Wall. Fruiting-branches with mature receptacles: *of natural size.*

Plate 84^{w2}.— 1, male flower, the two anterior pieces of the perianth having been removed; 2, the same opened out; 3, sessile gall flower; 4, pedicillate fertile female; 5, fertile achene removed from perianth: *all enlarged.*

W. H. D'C.—Reg. No. 10078J—350—24-1-87.

Synœcia.—*Flowers unisexual or neuter; male flowers with 1 stamen; male and gall flowers in one set of receptacles, fertile female and neuter flowers in another set (neuters absent in* apiocarpa*); climbers with large coloured receptacles, the leaves tesselate beneath.*

Leaves scabrous . . . . 77. *F. aurantiaca.*

Leaves not scabrous.

  Leaves less than 2 inches in length, often dimorphous . . . . . 78. *F. punctata.*
  Leaves more than 2 inches in length, their apices blunt, their surfaces not conspicuously differing in colour . . . . 79. *F. callicarpa.*
  Leaves more than 2 inches long, with acuminate apices, the lower surface conspicuously white, tesselate . . . . 80. *F. Singalana.*

Neuter flowers absent . . . . 81. *F. apiocarpa.*

77. Ficus aurantiaca, *Griff.* (*non Wall.*) *Notulæ, pt.* 4. 394; *Icon. t.* 504. *fig.* ii. *Griff. Herb.* (*Kew Distrib.*) 4601.—*F. trachycoma*, Miq. in Zoll. Syst. Verz. 92; Fl. Ind. Bat. i. pt. 2. 304; Ann. Mus. Lugd. Bat. iii. 293; Teysm. and Binnend. in Nat. Tijdschr. Neerl. Ind.—*F. Guillielmi*, i. De Vriese MSS.

A scandent, scabrous shrub, with very large receptacles. Leaves petiolate, thickly coriaceous, ovate-elliptic, slightly inequilateral, apiculate or acute, with entire recurved edges and rounded 3-nerved base; lateral nerves 8 or 9 pairs, strong but not very prominent; under surface scabrous from numerous harsh, broad, elevated pustules (often of a pale colour), between which are scattered short stiff bristles; upper surface hispid when young, but afterwards shining and smooth; length of blade 2·5 to 4 in.; petioles stout, scabrid, ·5 to ·6 in. long; stipules ovate-lanceolate, subulate, glabrous, ·6 in. long, 2 to each leaf. Receptacles large, pedunculate, solitary, scabrous; when young very prominently umbonate; umbilicus with large scales; when ripe nearly smooth, ovoid-cylindric, tapering to base and apex; of a rich russet red colour; about 2·3 in. long and 1·5 in. broad; ebracteolate at the base; peduncle ·5 in. long, scabrid, with 3 broad rounded bracts at its origin from the axis. Male and gall flowers not seen. Fertile female flowers intermixed with neuters, sub-sessile; the perianth of 5 linear distinct pieces; the ovary ovoid; style lateral, short, thick;

stigma large, deeply divided into 2 or 3 subulate spreading arms. Neuter flowers containing no trace of anther or pistil mixed with the fertile females over all parts of the receptacle, shortly pedicellate; the perianth of 3 linear-lanceolate segments.

Java, on Mount Salak; near Malacca,—*Griffith.* By no means a common plant, and very poorly represented in collections.

Plate 87.—Fruiting-branch of *F. aurantiaca*, Griff. 1, leaf to show nervation; 2, vertical section of receptacle—*of natural size;* 3, fertile female flower; 4, ovary with style and tricrural stigma; 5, ditto with bicrural stigma; 6, neuter flower: *all from the same receptacle and all enlarged.*

78. Ficus punctata, *Thunb. Fic.* 9; *Lond. Journ. Bot.* vii. 440; *Ann. Mus. Lugd. Bat.* iii. 268, 289.—*F. macrocarpa*, Bl. Bijd. 459.—*F. falcata*, Thunb. Fic. No. 5.—*Synœcia falcata*, Miq. in Lond. Journ. Bot. vii. 470. tab. xi; Miq. Fl. Ind. Bat. i. pt 2. 329; Miq. Choix de Pl. Rares de Buitenzorg, tab. 14; Pl. Jungh. 67.—*Synœcia serpens*, Miq. Pl. Jungh. 67; Wall. Cat. 4574, "F. stipulata."

A much-branched creeping shrub; the young branches, petioles, stipules and receptacles with dark reddish brown pubescence, ultimately nearly glabrous. Leaves shortly petiolate, coriaceous, glabrous, shining above, tesselate-punctate below, always more or less oblique, varying from oblanceolate gradually narrowed to the nearly equal-sided base to oblong-subrhomboidal with very unequal sides; apex blunt or sub-acute, base rounded or truncate, very unequally sided. All forms are penni-nerved, with 2 to 4 lateral primary nerves; in the smaller and more oblique leaves the lateral nerves are, however, nearly obsolete on one side; basal nerves from 3 to 5, irregular; reticulations rather distinct on the upper surface, on the lower surface very distinct and beautifully white, tesselate-punctate; length of blade ·5 to 1·5 in., or rarely 2 in.; stipules 2 for each leaf from the stem near insertion of petiole, ovate-lanceolate, membranous, about as long as the petiole. Receptacles usually pubescent when young, ultimately glabrous, pedunculate, solitary or in fascicles from the branches or the main stem; when young often strongly umbonate; when ripe varying in shape from globular to ovoid, obovoid or pyriform; colour from russet brown to brilliant orange red; often dotted; length from ·5 in. to 1·4 in.; peduncles thick, varying in length from ·25 in. to as much as 2 in., with 3 ovate-triangular, rounded, spreading bracts united by their bases so as to form a kind of cup a little above the base; the base itself often thickened into a many-bracted woody tubercle. Male flowers rather numerous in the receptacles containing gall flowers, stipitate, with one oblong elongate stamen and a perianth of 3 broad distinct pieces. Gall flowers with a perianth of 3 distinct linear pieces; the ovary stipitate, smooth; the style thick, short, subterminal. Fertile female flowers in separate receptacles, mixed with numerous neuters; perianth of fertile females of 3 hyaline linear distinct pieces; the ovary stipitate, oblong, with hyaline margins, smooth; style terminal elongate; stigma bifid. Neuter flowers, containing no trace either of anther or pistil, as numerous as the fertile females, and mixed with them, stipitate, the perianth of 3 distinct linear pieces.

Malayan Peninsula and Archipelago; not uncommon on trees and rocks.

A very remarkable and beautiful species, varying much in fruit and in the shape of the leaves even in the same plant, the leaves on the small branchlets from the lower part of the main stem being often much smaller than those from branches near its apex, and occasionally different in form.

The forms presented by this species may be arranged into two groups:—

(*a*) Forma typica. Leaves oblanceolate, slightly unequal-sided, and gradually narrowed to the base. This is the typical *F. punctata* of Thunberg.

(*b*) Var. falcata. Leaves oblong, subrhomboidal, not tapering to the base. This is the typical *F. falcata* of Thunberg, and *Synœcia falcata* and *serpens* of Miquel.

Plate 88.—*F. punctata*, Thunb. Typical form, with separate figures of receptacles of various ages, and of a stipule: *all of natural size.*

Plate 89.—*F. punctata*, Thunb. var. *falcata.* Leafy branch and stems with receptacles in various stages of maturity: *all of natural size.*

Plate 101A.—*F. punctata.* 1, male flower; 2, gall flower (from the same receptacle); 3, fertile female flower; 4, pistil, the perianth having been removed; 5, neuter flower from the same receptacle as the fertile female, closed; 6, the same, opened: *all much enlarged.*

79. Ficus callicarpa, *Miq. Ann. Mus. Lugd. Bat.* iii. 268, 289, *t.* 10. *fig.* B.—*Synœcia Sumatrana*, Miq. Fl. Ind. Bat. i. pt. 2. 329.—*F. pomifera*, Kurz For. Flora Brit. Burm. ii. 454.

A strong creeping or scandent shrub; all parts glabrous when adult; main stem flattened. Leaves shortly petiolate, coriaceous, obovate or somewhat rhomboid-obovate, slightly inequilateral; the apex blunt, slightly and obtusely mucronate, gradually narrowed to the slightly unequal, obscurely 3-nerved base; edges entire, and slightly recurved; lateral primary nerves 3 to 4 pairs, not very prominent; upper surface shining, smooth, the reticulations obsolete; under surface smooth, or with a few scattered strigose hairs, especially on the midrib and main nerves; reticulations very distinct, enclosing numerous depressions which are filled with minute hairs; length of blade 2·5 in. to 4 in.; petioles scurfy, ·3 in. to ·5 in. long; stipules linear-lanceolate, glabrous, 2 for each leaf, shorter than the petiole, persistent. Receptacles large, solitary, pedunculate, from the branches or main stem, slightly umbonate, sub-globular, pyriform or obovoid, gradually narrowed at the base into the short, thick peduncle, smooth or (*fide* Miquel) muricate-papillose; when ripe yellowish, mottled, from 1·5 in. to 2·35 in. long; peduncle about ·5 in. long, with 3 ovate-acute spreading bracts about its middle, which being united by their bases form a wide gaping cup; peduncle inserted into a more or less knotted, many-bracteolate tubercle (abortive branch). Male flowers numerous, stipitate, filling the upper third of the receptacle; stamen 1; the anther large, broad, and thick, the perianth of 3 linear distinct pieces. Gall flowers stipitate; the perianth of 3 very long and narrow, distinct pieces; the ovary smooth, ovoid-elliptic, with short, thick terminal style and slightly dilated stigma. Fertile female flowers mixed with the neuters, sub-sessile or stipitate, perianth with 1 or 2 linear leaves; ovary stipitate, smooth, ellipsoid, its edges hyaline; the style thin, terminal, much elongate; the stigma of 2 thin, spreading or recurved arms. Neuter flowers as numerous as the fertile females, long pedicelled; the perianth of 3 short linear leaves; anther and pistil absent.

Burmah, Malayan Peninsula, and Archipelago.

Miquel's figure and description represent the receptacles as muricated, but I have seen no specimen in the Dutch Herbaria which has that character. I have myself collected the plant in the Johore forests, and Mr. Kunstler has found it rather plentifully in Perak, but always with smooth receptacles.

Plate 90.—*F. callicarpa*, Miq. Leaves and mature receptacles, with separate figures of a stipule and of a muricated receptacle (*the latter copied from Miquel's figure, Ann. Mus. Lugd. Bat.* iii. *tab.* XA. *fig.* 1): *of natural size.*

Plate 101B.—*F. callicarpa*, Miq. 1, male flower; 2, gall flower; 3, 4, & 5, fertile female flowers; 6, neuter flower: *all much enlarged.*

80. Ficus singalana, *nov. spec.*

A creeping shrub, the stems and branches emitting rootlets; the young shoots deciduously tomentose. Leaves petiolate, coriaceous, glabrous, ovate-elliptic, entire; the apex shortly acuminate; the base cuneate, 3-nerved; primary lateral nerves about 4 pairs, prominent below, as is the midrib; on the lower surface the reticulations areolar, the areolæ with white dots arranged in groups of 4; upper surface smooth, shining; length of blade 3 to 4 inches; petiole ·5 to ·75 in.; stipules linear-lanceolate, glabrous, ·7 in. long. Receptacles on short rough tubercles from the old wood, pedunculate, solitary, ovoid or sub-globular, umbonate, smooth; when ripe, 4·5 in. long by 3·5 in. broad; the umbilicus prominent, closed by many large scales; the base contracted into a thin stalk ·3 in. long at the junction of which with the peduncle proper are 3 ovate bracts; peduncle stout, woody, tuberculate, nearly 1 in. long.

On Mount Singalan, in Western Sumatra, at an elevation of 1,800 ft.,—*Sig. Beccari* (Herb. Becc. P. S. 289).

A magnificent species, allied to *F. punctata*, Thunb., but well distinguished by its much larger, differently shaped leaves, and by its larger receptacles.

Plate 91.—*F. Singalana*, King. 1, apex of leafy branch; 2, stem with mature receptacle—*of natural size;* 3, stipule—*enlarged;* 4, piece of under surface of a leaf: *much enlarged to show the areolæ.*

81. Ficus apiocarpa, *Miq. Ann. Mus. Lugd. Bat.* iii. 269, 289.—*F. tetangis*, Miq. Fl. Ind. Bat. Supp. 432.—*Urostig. apiocarpa*, Miq. l.c. 440; Wall. Cat. 4570E, in part.

A scandent shrub; branches and petioles more or less pubescent and scurfy when young, ultimately glabrous, or nearly so. Leaves long-petiolate, coriaceous above, glabrous and shining below, closely covered with short, soft, minute hairs when young, afterwards glabrous, the reticulations distinct and often coloured; from ovate to ovate-oblong, rather abruptly and shortly acuminate; the edges entire, base rounded or slightly narrowed, 3-nerved; lateral nerves 2 or 3 pairs; length of blade from 4·5 in. to 10 in.; petioles 1·5 to 2 in.; stipules in pairs, ovate lanceolate, puberulous, ·6 in. long. Receptacles pedunculate, axillary, in pairs from the axils of the leaves (one often abortive), at first pubescent, but ultimately glabrous, ovoid or elongate-pyriform, very gradually narrowed at the base into the thick peduncle; when ripe from 1·25 in. to 2 in. long, smooth, and of a dark red colour with yellowish spots; peduncle from 1 to 2 in. long, with 3 broad, ovate, minute, united bracts near its base. Male flowers in the same receptacles as the gall flowers, and mixed with them over all parts of the interior of the receptacles, monandrous; the anther ovate-elliptic, filament long; perianth of 3 long, linear, distinct pieces. Gall flowers with perianths like the males; the ovary stipitate, rather rough, ovoid-elliptic; the style terminal, rather thick. Fertile females with a hyaline, gamophyllous perianth, divided above into 3 segments; the achene elliptic, with pale edges, shortly stipitate. Neuter flowers absent.

Malayan Peninsula and Archipelago. Not uncommon.

This species varies as to pubescence while young, but the adult leaves are always glabrous. There are two distinct forms of receptacles, and this led Miquel to form two species. To plants with elongate-pyriform receptacles he gave the specific name *apiocarpa*; those with ovoid receptacles he named *tetangis*. These differences in external form are not, however, as I have satisfied myself by numerous dissections, associated with sexual differences; for ovoid and pyriform receptacles alike may contain either males and gall flowers or fertile females only. The sexual flowers closely resemble those of *punctata*, *callicarpa*, and *aurantiaca*; but neuter flowers are entirely absent in this species.

Wall. Cat. 4570, sheet E, consists of leaves of this species mixed up with leaves and fruit of *F. indica* and *F. obtusifolia*.

PLATE 92.—*F. apiocarpa*, Miq. Branch with ovoid receptacle; 2, pyriform receptacle (*from another specimen*); 3 stipules—*all of natural size;* 4, male flower; 5, young gall flower; 6, the same, further advanced; 7 & 8, fertile female flower and its gamophyllous perianth; 9, fertile mature achene: *all enlarged.*

Sycidium.—*Flowers unisexual; male and gall flowers in one set of receptacles, fertile female flowers in a distinct set of receptacles; male flowers with* 1 *stamen (sometimes* 2 *in Nos.* 83, 93, 99, *and* 102) *; leaves alternate; receptacles small, more or less scabrid, axillary or in a few species in fascicles from the stem; shrubs, small trees, or climbers, rarely epiphytal.*

Leaves variable in shape, more or less ovate, often irregularly lobed.

An erect shrub, receptacles pyriform, in axillary fascicles . . . . 82. *F. purpurascens.*
,, ,, ovoid-globose, in pairs, axillary . . . . 83. *F. Bhotanica.*

Small ground creepers.
Receptacles half an inch or more in diameter . . . . 84. *F. heterophylla.*
Receptacles less than half an inch in diameter, never pyriform . 85. *F. quercifolia.*

Leaves more or less ovate or elliptic, not lobed, nor much contracted in the lower third, mostly scabrid.

A creeping shrub . . . . 86. *F. nigrescens.*

Trees or erect shrubs.
Leaves equally cordate at the base . . . . 87. *F. heteropoda.*
Leaves unequally cordate at the base . . . . 88. *F. semicordata.*

Leaves not cordate at the base.
Softly tomentose on the lower, scabrid on the upper surface. 89. *F. conjugata.*
Pubescent on the lower, lepidote on the upper surface; receptacles 1·5 inch in diameter . . . . 90. *F. conspicabilis.*

Scabrid-hispid on both surfaces.
Receptacles ·5 inch or more in diameter, lateral primary nerves ascending . . . . 91. *F. asperrima.*
Receptacles less than ·5 inch in diameter, nerves transverse . . . . 92. *F. Swinhoei.*

Leaves elongate, ovate, or obovate, conspicuously narrowed in the lower third.

Leaves very inequilateral; receptacles axillary or in fascicles from the stem . . . . 93. *F. obscura.*

Leaves not conspicuously inequilateral.

Leaves not emarginate at the base, smooth . . . . 94. *F. Madurensis.*
Leaves emarginate or minutely cordate at the base.
Receptacles more than an inch in diameter . . . . . . 95. *F. mespiloides.*

Receptacles not more than ·5 inch in diameter.

Leaves smooth, or only slightly hispid when young.

Leaves obovate-elliptic, apex rather suddenly cuspidate . . . . 96. *F. brevicuspis.*
Leaves elliptic-oblong, apex gradually acuminate . 97. *F. Balica.*

Leaves scabrid-hispid.

Leaves with 3 to 6 pairs of primary lateral nerves; young parts rufous hairy . . . . 98. *F. rudis.*
Leaves with 5 to 8 pairs of primary lateral nerves; young parts not rufous hairy . . . . . . 99. *F. copiosa.*

Leaves more or less oblong, tapering to both base and apex.

Apex of leaves ending in a narrow tail about an inch or more long.

Scandent or creeping . . . . 100. *F. rostrata.*

Erect shrubs or small trees.

Receptacles clavate or sub-globular, never less than ·35 inch in diameter . . . . 101. *F. clavata.*

Receptacles very small, not more than ·2 inch in diameter.

Venation of leaves transverse . . . . 102. *F. cuspidata.*
„ „ oblique . . . . 103. *F. Sikkimensis.*

Apex of leaves acuminate, without an abrupt narrow terminal tail.

Scandent, leaves very scabrid, receptacles pisiform . . . 104. *F. ampelas.*
An erect shrub; receptacles axillary, depressed-globular. . 105. *F. umbonata.*
A small tree; receptacles axillary, pisiform . . . . . . 106. *F. asperior.*

Leaves narrowly linear-lanceolate: small trees.

Leaves entire, or gibbous towards the base . . . . 107. *F. irregularis.*
Leaves serrate-dentate . . . . 108. *F. Cumingii.*

Leaves very large (15 *to* 20 *inches long*), *with more or less rufescent pubescence.*

Leaves panduriform, the edges coarsely and unequally inciso-dentate . 109. *F. decipiens.*
Leaves broadly ovate to obovate-elliptic, edges regularly and finely dentate . . . . 110. *F. pungens.*

Perianth of the flowers ciliate; the interior of the receptacle hispid; receptacles axillary.

Leaves inequilateral, receptacles pedunculate . . . . 111. *F. melinocarpa.*
Leaves equilateral, receptacles sessile . . . . 112. *F. Riedelii.*

Leaves variable in shape, more or less ovate, often irregularly lobed.

82. FICUS PURPURASCENS, *Bl. Bijd.* 471; *Miq. Fl. Ind. Bat.* i. *pt.* 2. 299; *Choix de Pl. Rares de Buitenzorg, t.* 10; *Ann. Mus. Lugd. Bat.* iii. 271, 291.

An erect shrub, the leaves purple beneath; young parts with short stiff hairs. Leaves petiolate, membranous, ovate-elliptic, slightly inequilateral; the edges coarsely serrate-crenate, sometimes sinuate or lobed and almost pinnatifid in the upper half; apex acuminate; base narrowed or rounded, 3-nerved; lower surface scabrous, upper sub-scabrid or smooth; lateral primary nerves about 5 to 8 pairs; length 5 to 7 in.; petioles from ·5 to 1 in; stipules ovate-lanceolate, small. Receptacles pedunculate, in axillary fascicles, pyriform, yellow when ripe, from ·25 to ·5 in long; peduncles ·2 to ·4 in. long.

Forests of Java.

Well figured by Miquel (my figure is a copy of his), but not well represented in Herbaria. Evidently closely allied to *F. humilis*, Roxb., but distinguished from that by its fasciculate pyriform receptacles and erect—not creeping—habit.

PLATE 93.—Fruiting branch of *F. purpurascens*, Bl.

83. FICUS BHOTANICA, *nov. spec.*

An erect shrub; the young branches tomentose. Leaves petiolate, membranous, oblong, obovate-oblong to broadly lyrate; the apex more or less acuminate; the edges from irregularly 3 toothed or lobed towards the apex to deeply lyrate; the base rounded or sub-truncate, 3-nerved; upper surface strigose-scabrid, lower tomentose; lateral nerves about 5 pairs; length of blade 3·5 in. to 4·5 in., breadth 1·5 in. to 3·5 in.; petioles ·5 in. to ·75 in; stipules ovate-lanceolate, scarious, their midribs tomentose, ·5 in. long Receptacles pedunculate, in pairs, axillary, ovoid, with prominent, umbonate, many-bracted umbilicus; hispid when young, nearly smooth when ripe; length ·75 in., breadth ·5 in.; basal bracts 3, ovate-acute, scarious; peduncles ·2 in long, tomentose. Male flowers pedicelled; the perianth of 5 linear-lanceolate pieces; stamens 1 or 2; the anthers broadly ovate. Gall flowers with perianth like the males, but longer; the ovary ovoid, smooth; the style short, sub-terminal. Fertile female flowers with perianth like the males, but half as long; achene triangular, rounded, smooth; the style lateral, shorter than the ovary.

Eastern Dooar of Bhotan,—*Griffith*; plains of Assam, in Luckimpore,—*Masters*; in Darrang,—*G. Mann.*

Previously to Mr. Mann's collecting good specimens of this species in the plains of Assam, it was represented by imperfect specimens, which in the Calcutta Herbarium were referred to *F. heterophylla*, Linn. fil. I am now satisfied that it is distinct. Some of the male flowers have two stamens.

PLATE 205B.—*F. Bhotanica*, King. Branch with receptacles, not quite mature. 4, apex of receptacle; 5, base; 6, stipules,—*all of natural size*; 7, male flower; 8, gall flower; 9 & 10, fertile female flowers: *enlarged.*

84. FICUS HETEROPHYLLA, *Linn. fil. Supp.* 442; *Roxb. Fl. Ind.* iii. 531; *Miq. in Lond. Journ. Bot.* vii. 231; *Fl. Ind. Bat.* i. *pt.* 2. 297; *Ann. Mus. Lugd.*

Bat. iii. 271, 291; *Wight's Icon* 659; *Brandis For. Flora* 424; *Kurz For. Flor. Brit. Burm.* ii. 456; *Dalz. Fl. Bomb.* 243.—*F. truncata*, Vahl. Symb. Bot. i. 83; Ham. in Linn. Trans. xv. 143-55.—*F. rufescens*, Vahl. Enum. ii. 203.—*F. denticulata*, Vahl. Symb. Bot. i. 83; Bl. Bijd. 472.—*F. aquatica*, Koenig ap. Willd. Spec. Pl. iv. 1133.—*F. scabrella*, Roxb. Fl. Ind. iii. 532; Wight's Icon 661; Miq. in Lond. Journ. Bot. vii. 229; Kurz For. Flor. Brit. Burm. ii. 455.—*F. repens*, Willd. Spec. Pl. iv. 1149; Roxb. Fl. Ind. iii 535; Wight's Icon 636; Miq. Lond. Journ. Bot. vii. 226.—*F. repens* and *F. rufescens*, Ham. in Trans. Linn. Soc. xv. 143.—*F. rubifolia*, Griff. Not. Pl. Dicot. 399. t. 557. ii, iii; *Covellia Griffithii*, Miq. in Lond. Journ. Bot. vii. 467.—*F. Assamica*, *acutiloba*, *elongata*, and *subpanduræformis*, Miq. in Lond. Journ. Bot. vii. 226, 227. t. V a. 231, 235.—*F. grossularioides*, Burm. Fl. Ind. 227.—*Valli teregam*, Rheede Hort. Mal. iii. 83. t. 62; Wall. Cat. 4475A to L, 4521.—*F. exasperata*, not of Roxb. (present in Calcutta set; absent in Linn. Soc. set).

A shrub, sometimes creeping on the ground or over rocks, with shortly pubescent stem and branches, the leaves very variable, scabrid. Leaves petiolate, membranous; general outline usually more or less ovate-elliptic, but varying from elongate-lanceolate to ovate or ovate rotund, often irregularly 3- to many-lobed, with the apex more or less acuminate; the edges irregularly and coarsely dentate or dentate-repand; the base blunt, rounded, or cordate, 3- to 5-nerved; both surfaces scabrous and covered with short stiff hairs; lateral nerves from 4 to 8 pairs according to the length of the leaf (in the much-lobed leaves the nervation is palmate); length of blade 2 to 4 in., petioles varying from ·5 to 2·5 in.; stipules 2 to each leaf, scarious, ovate, glabrous or nearly so, ·3 to ·4 in. long. Receptacles on peduncles of varying length, solitary, axillary, spherical to elongated-pyriform, always with a more or less prominent mammillate umbilicus which is but imperfectly closed by bracts, more or less hispid-scabrid and sometimes verrucose when young; when ripe nearly smooth, dark orange, and from ·4 to 1 in. long; basal bracts minute, triangular, glabrous, (in the much elongated forms appearing to rise from below the base of the receptacle); peduncle proper from ·4 to 1 in. long. Male flowers with a 3 or 4-cleft gamophyllous perianth and a single stamen. Gall flowers with perianth like the males; the ovary ovoid, smooth, with short lateral style. Fertile female flower with gamophyllous 4-cleft perianth; the achene subglobular, minutely tuberculate, with a hyaline, viscid external coat; style long, lateral; stigma cylindric.

On the plains in the warmer parts of India, in Ceylon, Burmah, and the Malayan countries. Common in grassy places, especially near water.

This is a polymorphic species, and often presents great variety in foliage even in the same plant. I have examined the types of most of the species of Blume and Miquel which I have reduced here, and I am convinced that they are mere forms of one widely-spread species. The only forms sufficiently constant to be separated as varieties appear to me to be the two following:—

VAR. 1. SCABRELLA (=*F. scabrella*, Roxb.). Leaves narrow, shortly petiolate, not lobed; receptacles shortly pedicellate, globular or sub-pyriform.

VAR. 2. VAR. REPENS (=*F. repens*, Willd. and Roxb.) Leaves broad, long-petiolate; receptacles long-pedunculate, more or less pyriform. Under this variety falls *Covellia Griffithii*, Miq., of which I have seen the type at Kew.

PLATE 94.—1, *F. heterophylla*, *Linn. fil.*, fruiting-branch; 2, var. *scabrella*; 3 & 4, var *repens—all of natural size;* 5, male flower with 3-cleft perianth; 6, male flower with 4-cleft perianth; 7, gall flower with 3-cleft perianth; 8, 4-cleft perianth of fertile female flower; 9, ripe achene: *all enlarged.*

85. FICUS QUERCIFOLIA, *Roxb. Fl. Ind.* iii. 534; *Wight's Icon* 646; *Lodd. Bot. Cab. t.* 1540; *Miq. in Lond. Journ. Bot.* vii. 232; *Fl. Ind. Bat.* i. *pt.* 2. 297; *Ann. Mus. Lugd. Bat.* iii. 291.—*F. humilis*, Roxb. Fl. Ind iii. 535; Wight's Icon 635; Miq. Fl. Ind. Bat. i. pt. 2. 299; Miq. in Ann. Mus. Lugd. Bat. iii. 271, 291.—*F. sinuosa*, Miq. Lond. Journ. Bot. vii. 232; Miq. Ann. Mus. Lugd. Bat. iii. 291.—*F. inconstans*, Miq. Lond. Journ. Bot. vii. 232, 330.—*F. biglanduta*, Bl. Bijd. 475.—*F biglandulosa*, Miq Fl. Ind. Bat. i. pt. 2. 298; Suppl. 173, 426—*F. anastomosans*, Wall. Cat. 4533; Kurz For. Fl. Burm. ii. 455.—*F. repens*, Herb. Madras, Wall. Cat. 4546.—*F. montana*, Burm. Fl. Ind. 226 probably, but Burmann's description is very meagre.—*F. montana*, Burm? Bl. Bijd. 471.

A small shrub, very often creeping and rooting in the ground; the young parts more or less shortly hispid. Leaves shortly petiolate, thickly membranous, varying in shape from lanceolate-ovate or elliptic to obovate-elliptic; coarsely crenate-serrate, especially in the upper half, sometimes more or less irregularly lobed; apex more or less acuminate or shortly cuspidate; base more or less acute or cuneate, rarely rounded, 3- to 5-nerved; lateral primary nerves from 5 to 7 pairs, at right angles to the midrib, prominent on both surfaces; under surface scabrid, with a few short stiff hairs especially on the nerves; upper surface sub-scabrid, or smooth and shining; the midrib and nerves shortly and deciduously hispid; length of blade 2 to 5 in.; petioles ·4 to 1 in., hirsute; stipules 2 from each leaf, lanceolate, ·25 in. long Receptacles shortly pedunculate, usually axillary, sometimes in pairs, rarely from the branches below the leaves; ovoid or sub-globose; scabrid-hispid, prominently umbonate when young; when mature globular, rather flattened at the apex, crimson; from ·25 to ·4 in. across; basal bracts none; peduncles ·25 to ·4 in. long, with 1 to 2 scattered linear bracts above their bases. Male flowers with 1 stamen; the anther broadly ovate; the perianth of about 2 pieces, sometimes absent. Gall flowers with perianth like the males; the ovary ovoid-globose, smooth; style short, lateral. Fertile female flowers with minute 3-leaved hyaline perianth; the achene broadly ovoid, minutely tuberculate; style long; stigma cylindric. The perianth of all the flowers is very irregular and imperfect.

Widely distributed in Burmah and the Malayan Peninsula and Archipelago up to 2,500 ft.; growing in crevices of rocks and on the ground.

Rather a variable species, allied to *heterophyila*, Linn. fil., from which it is best distinguished by its smaller, pisiform, never pyriform, receptacles. I have seen types of most of the species which I have reduced here. Of *F. montana*, Burm., I have seen no authentic specimen, and I presume none exists; but I have seen what Blume considered to be Burmann's plant. From Burmann's description it is impossible to determine exactly what he meant. I have therefore taken Roxburgh's name *quercifolia* for the species, as his description and figure (copied by Wight as Icon. 646) give a good idea of what his plant is, and to it I have reduced as a variety the Roxburghian species *humilis*, which Roxburgh obtained also from Sumatra.

FORMA TYPICA. Leaves grossly crenate-sinuate, often deeply lobed.—*F. quercifolia*, Roxb.

Var. HUMILIS. Leaves serrate or sub-entire, never lobed.—*F. humilis*, Roxb.

PLATE 95.—A, fruiting-branch of *F. quercifolia*, Roxb.; B, var. *humilis*: *of natural size.* 1, male flower; 2, naked stamen; 3, gall flower (from B)—*enlarged;* 4, perfect female flower (from A) with imperfect perianth: *enlarged.*

Leaves more or less ovate or elliptic, not lobed, not much contracted in the lower third, mostly scabrid.

86. FICUS NIGRESCENS, *nov. spec.*

A creeping shrub, often rooting at the nodes; the young branches softly pubescent, ultimately becoming glabrous. Leaves alternate, petiolate, broadly ovate or ovate-rotund, with cordate 5-nerved base (two of the nerves minute), the edges coarsely serrate-dentate; the apex shortly acuminate; lower surface rather harshly pubescent, the upper minutely adpressed-hispid; lateral primary nerves about 3 pairs; length of blade 1·5 in. to 2 in.; petioles pubescent, from ·6 in. to ·75 in. long; stipules in pairs, lanceolate, scarious, glabrous, about half as long as the petioles. Receptacles in pairs (one often abortive) on short, bracteolate tubercles from the axils of fallen leaves; shortly pedunculate, depressed-globose, rather harshly pubescent, nearly black when ripe, about ·4 in. in diameter; basal bracts 3, broadly ovate, rather large; pedicels about ·15 in. long. Male and gall flowers not seen. Fertile female flowers shortly pedicellate, the perianth of three lanceolate pieces; achene obovoid, minutely tuberculate; the style lateral, longer than the achene; stigma cylindric.

Munipur, at 5,000 ft.; Kegurina, in the Naga Hills, Assam, at 5,800 ft.,—*Mr. C. B. Clarke.*

A small species, creeping on the ground and often rooting. The figs when ripe are, according to Mr. Clarke (who alone has collected this), nearly black, and from this circumstance I have named the species. Although I have not seen the male flowers of this plant, I put it into this section with confidence, its affinities being clearly with *heterophylla*, *quercifolia*, and *ampelas.*

PLATE 95*a*.—*F. nigrescens, King—of natural size.* 1, fertile female flower: *enlarged.*

87. FICUS HETEROPODA, *Miq. in Ann. Mus. Lugd. Bat.* iii. 232, 296.

A tree, the young parts scabrid-hispid. Leaves opposite; those of the same pair unequal in size and unequally petiolate, from broadly ovate to elliptic; the apex acute or sub-acute; the edges rather coarsely and irregularly crenate-serrate; the base deeply cordate, slightly unequal, 5-nerved; primary lateral nerves about 6 pairs; both surfaces scabrous-hispid; length of blade 5 to 10 in.; petioles ·75 to 4 in. long, scabrid; stipules lanceolate, hispid,

·5 in. long. Receptacles in fascicles from short rough tubercles on the stem and larger branches, pedunculate, globose, pyriform, umbonate, slightly verrucose, shortly hispid, pale yellow when ripe, about ·6 in. across; umbilical scales prominent; basal bracts none or irregular; peduncles thin, hispid, with 1 or 2 bracteoles, nearly 1 in. long. Fertile female flowers with a gamophyllous, deeply 5-cleft perianth; carpel elongate-ovate; style thin, lateral. Male and gall flowers not seen.

Island of Halmaheira, in Western Celebes,—*Teysmann.*

This species approaches *hispida* in the shape and hispidity of the leaves, but is readily distinguished by the inequality in size of the leaves of the same pair, and in the long-peduncled, sub-pyriform receptacles. The fertile female perianths of this are, however, gamophyllous, 5-cleft, while the female flowers of *hispida* have no perianth separable from the carpel.

Plate 96.—*F. heteropoda*, Miq. 1, leaf twig; 2, fascicle of nearly mature receptacles; 3, apex of a receptacle; 4, stipules—*all of natural size;* 5, fertile female perianth with five lanceolate segments united below; 6, carpel: *enlarged.*

88. Ficus semi-cordata, *Miq. Ann. Mus. Lugd. Bat.* iii. 226, 293.—*F. begoniæfolia*, Teysm. MSS. (non Wall.)

A tree, hispid in all its parts. Leaves petiolate, subcoriaceous, very unequal-sided, broadly ovate, falcate; the apex shortly acuminate; edges minutely dentate, rarely entire; base strongly semi-sagittate, with 4 to 5 semi-palmate radiating basal nerves; lateral primary nerves about 4 pairs, prominent, especially below; intermediate nervation transverse and, like the reticulations, coarse and distinct; the whole of the lower surface covered with short, rather soft pale hairs; midrib and nerves scabrid; upper surface scabrous from numerous minute sharp points, with some scattered, short, bristly hairs; midrib and nerves pubescent-hispid, as are also the stout ·4- to ·5-in. long petioles; stipules lanceolate, acuminate, pubescent, longer than the petioles. Receptacles long-pedunculate, in fascicles from clustered abortive shortly bracteolate branchlets (tubercles) borne on the stem and larger branches; strongly umbonate when young; when old globular and not umbonate, but always with a broad umbilicus the scales of which are numerous and large; constricted at the base into a slender stalk; shortly hispid; about ·5 in. across; bracts at the base of the constricted part of the receptacle 3, ovate, acute, minute; peduncle proper scabrous, slender, about ·6 in. long. Male flowers rather numerous near the mouth of the receptacle, with 3 lanceolate perianth-leaves; stamen 1; anther elongate, its loculi deeply grooved. Gall flowers with a 4-leaved perianth; carpel obovoid; style lateral; the receptacles hispid inside. Fertile female flowers not known.

Celebes,—*Teysmann.*

Plate 97.—Branch of *F. semi-cordata*, Miq. 1, a fascicle of young receptacles from one of the larger branches below the leaf region; 2, lateral view of a mature receptacle; 3, apex of a mature receptacle; 4, basal bracts; 5, stipules—*all of natural size;* 6, male flower; 7, female flower: *enlarged.*

89. Ficus conjugata, *Miq. Ann. Mus. Lugd. Bat.* iii. 222, 291.

A small tree (?); the young branches scabrid, shortly setose; leaves opposite, petiolate, thickly membranous (almost coriaceous), ovate-elliptic or elliptic, the apex acute; edges entire revolute; the base broad, cordate, with 2 pairs of minute basal and 1 prominent pair of supra-basal nerves; lateral primary nerves about 6 pairs, rather prominent (as are the reticulations) on the lower surface and pubescent; the rest of the lower surface covered with dense soft grey tomentum; upper surface scabrous, papillose, sparsely hispid; length of blade 5 to 6 in.; petioles about ·75 in. long, hispid; stipules ovate-lanceolate, scarious, nearly glabrous, ·25 in. long. Receptacles pedunculate, solitary, axillary, globose-umbonate; when young scabrous-hispid, much narrowed towards the base, with 3 ovate, nearly glabrous, basal bracts (mature receptacles unknown); peduncle proper hispid, about ·2 in. long. Male flowers with a 5-cleft perianth and 1 stamen; galls with a similar perianth, ovoid achene, and lateral style. Fertile female flower not seen.

Java,—*Teysmann*, *De Vriese.*

Plate 98.—Fruiting-branch of *F. conjugata*, Miq. 1, lateral view of receptacle; 2, apex of receptacle—*of natural size;* 3, male flower; 4, gall flower: *enlarged.*

90. FICUS CONSPICABILIS, *nov. spec.*

A tree(?); the young branches and leaf-buds covered with short, deciduous, yellow hairs. Leaves broadly ovate or elliptic; the apex acute or shortly acuminate; the edges entire; the base broad, slightly unequal, sub-cordate, 7-nerved; primary lateral nerves about 6 pairs; secondary nerves subtransverse, little curved; lower surface pubescent, especially on the midrib and nerves; reticulations minute, distinct; upper surface minutely lepidote; length of blade about 8 in.; petiole ·8 in.; stipules densely covered with long yellow silky hairs. Receptacles large, shortly pedunculate, axillary, solitary, depressed-turbinate; both base and apex very concave; the surface wrinkled, rough, minutely tuberculate, deciduously hispid-tomentose; length from base to apex 1·1 in., breadth 1·6 in.; umbilicus much depressed, large, with numerous scales; basal bracts 3, broadly triangular; pedicel ·2 in. long, hispid. Female flowers sub-sessile or pedicellate; the perianth of three distinct dark-coloured pieces; ovary ovoid, smooth; style terminal, longer than the ovary in the sessile, shorter than the ovary in the pedicellate flowers.

New Guinea.—*Sig. Beccari* (Herb. Becc. P. P. 651).

Plate 99.—A branch of *F. conspicabilis*, King, with a mature receptacle. 1, a stipule —*of natural size;* 2, part of surface of receptacle—*slightly enlarged;* 3, pedicellate; 4, sub-sessile female flower: *both enlarged.*

91. FICUS ASPERRIMA, *Roxb. Fl. Ind.* iii. 554; *Wight's Icon* 633; *Miq. in Lond. Journ. Bot.* vii. 230; *Dalz. & Gibs. Fl. Bomb.* 243; *Bedd. Fl. Sylvat.* ii. 224.—*F. hispidissima*, Wight MSS. Miq. in Lond. Journ. Bot. vii. 229; Thwaites C. P. 2229.—*F. politoria*, Moon's Cat. 74 (not of Lamk.).

A shrub or tree, all the young parts very scabrous. Leaves collected about the extremities of the branches, alternate, petiolate, oblong-lanceolate to ovate or obovate or elliptic; the apex blunt or acuminate; the edges sub-entire, serrate-dentate, or crenate in the upper three-fourths, and entire towards the rounded or blunt 3-nerved base; lateral primary nerves 3 to 5 pairs, very prominent and hispid on the lower surface, as are the reticulations; the rest of the lower surface scabrid-hispid; upper surface pretty uniformly and strongly scabrous, and shortly hispid; length of blade from 1·5 in. to 5 in.; petioles ·4 in. to 1 in. long, stout; stipules minute. Receptacles pedunculate, often reflexed, scabrous-hispid, globular, slightly depressed at the apex, with rather a prominent umbilicus; umbilical scales erect; basal bracts none; when ripe yellow or purple with yellowish dots, ·5 in. to ·75 in. across. Male flowers numerous in the upper part of the receptacles, the perianth of 4 or 5 linear-lanceolate scabrid pieces; stamen 1; ovary of gall flowers ovate-lanceolate, with thick terminal style and dilated stigma; the perianth like that of the male flowers. Fertile female flowers with perianth of 6 or 7 linear-lanceolate smooth pieces; the achene elongated, obovoid, minutely tubercular; the style lateral, filiform; stigma obovate.

From the plains to elevations of about 3,000 ft. on the hill ranges of Central and Southern India, and in Ceylon.

A very distinct species, and not varying much. A narrow-leaved form was the basis of Wight's species *hispidissima.*

Plate 100.—*F. asperrima*, Roxb. Fruiting-branch. 1, leaf of the narrow-leaved form (*hispidissima*, Wight); 2 & 3, base and apex of a receptacle—*of natural size;* 4, male flower; 5, gall flower; 6, fertile female: *all enlarged.*

92. Ficus swinhoei, *nov. spec.*

A hispid shrub; the leaves petiolate, coriaceous, elliptic or sub-obovate-elliptic; the apex sub-acute; the edges slightly sinuate especially towards the apex; the base rounded or slightly contracted, 3-nerved; primary lateral nerves about 5 pairs; both surfaces dull and covered with minute, very short, stiff hairs; length of blade 2 to 2·5 in.; petiole stout, scabrid, ·2 in. long; stipules lanceolate, hispid, ·2 in long. Receptacles pedunculate, solitary, axillary, globular, contracted at the base; the umbilicus large and prominent; scabrid-hispid, red when ripe, ·35 in. across; basal bracts none; peduncle ·1 in. long, scabrid-hispid, with 3 broadly ovate spreading bracts at its base. Male flower not seen. Fertile female with a 4-cleft scabrid perianth; achene obliquely ovoid; style lateral.

Takow, Formosa,—*Mr. R. Swinhoe.*

A small shrub, growing in crevices on the sides of rocks. This comes near *F. gibbosa*, Bl. var. *parasitica*, but the leaves are not rhomboid, and they have more numerous lateral nerves.

Plate 101C —Branch of *F. Swinhoei*, King, with mature receptacles. 1, apex of a receptacle; 2, base of the same; 3, stipules—*all of natural size;* 4, perianth of fertile female flower 4-cleft; 5, achene: *enlarged.*

Leaves elongate, ovate, or obovate, conspicuously narrowed in the lower third.

93. Ficus obscura, *Bl. Bijd.* 474; *Miq. Fl. Ind. Bat.* i. *pt.* 2. 302; *Ann. Mus. Lugd. Bat.* iii. 272, 292.—*F. coronata*, Reinw. in Bl. Bijd. 470.—*F. scaberrima*, Bl. Bijd. 474; Miq. Fl. Ind. Bat. i. pt. 2. 304.—*F. asperiuscula*, Kunth et Bouché Ind. Sem. Hort. Berol. 21; Miq. in Lond. Journ. Bot. vii 234; Miq. Fl. Ind. Bat. i. pt. 2. 300; Pl. Jungh. 58.—*F. grewiæfolia*, Hort Berol. (non. Bl).—*F. Remblas* (in part), *brevipes*, Miq., and *hypsophila*, Miq. (in part); Miq. Pl. Jungh. 58, 60; Fl. Ind. Bat. i. pt. 2. 304, 305, 303.—*Covellia Zollingeriana* and *dasycaula*, Miq. Lond. Journ. Bot. vii. 460; Fl. Ind. Bat. i. pt. 2. 322.—

F. cyrtophylla, Wall. Cat. 4532.—*Covcilia cyrtophylla*, Miq. Lond. Journ. Bot. vii. 460.—*F. subdenticulata*, Miq. Fl. Ind. Bat. i. pt. 2. 323.

A bush or small tree, with very inequilateral (often semi-saggitate) leaves; all the young parts hispid-scabrous. Leaves shortly petiolate, membranous, oblong or elliptic, obovate-elliptic, oblanceolate or sub-trapeziform, very unequal-sided—the side next the stem being the narrower—more or less gradually narrowed to the apex, which is produced into a more or less elongate, narrow, entire, or sub-serrate acumen; edges, and especially the external edge, irregularly dentate-serrate, rarely sub-entire; the lower half of the inner edge sub-entire, often straight; base oblique, often semi-saggitate, 3- to 5-nerved, often with an additional nerve on the broader (auricled) side; lateral nerves from 4 to 5 pairs, or even more, prominent below; the whole of the lower surface, and particularly the midrib, nerves and reticulations hirsute or hispid (often minutely tuberculate); upper surface scabrous or sub-scabrous, minutely hispid (in some old leaves nearly glabrous); length from 5 to 10 in.; petioles ·3 to ·5 in. long; stipules lanceolate, deciduously hirsute, usually longer than the petioles. Receptacles sub-sessile or shortly pedunculate, axillary, in pairs, solitary by abortion, or fascicled; occasionally in fascicles from the main branches below the leaves and from stem, ovoid or globular, umbonate when young, and with rather prominent umbilical bracts, scabrous-hispid or hirsute, with one or two verruciform bracts on their sides, but no basal bracts; when ripe reddish or orange, from ·35 in. to ·75 in. across; peduncles absent, or from ·1 to ·4 in. long, with 1 to 3 scattered minute bracteoles, hirsute or hispid. Male flowers sessile or pedicellate, either monandrous with perianth of 4 pieces, or diandrous with perianth of 6 obovate pieces. Gall flowers mostly pedicellate; the perianth of 4 distinct lanceolate pieces; ovary smooth, sub-globular; style short, lateral; stigma dilated. Fertile female flowers with perianth of 5 narrowly-lanceolate, hyaline pieces; achene rotund-ovoid; style long, lateral; stigma cylindric; interior of perianth slightly hispid.

The lower Himalayan forests of North-Eastern India through the Khasi Hills, Burma, and the Malayan Peninsula to the Malayan Archipelago, from the sea level up to 2,000 or 3,000 ft. Very common, and presenting many forms.

I have carefully examined the types of almost all the species which I have reduced to this, and I can find no reason to keep them up even as varieties. Indian specimens of this were issued by Wallich as *F. cyrtophylla*, but I do not find that the Indian plant can be separated as a stable form. I have had ample opportunity of seeing it in its native forests, and I have found greater variation amongst specimens collected on a single mountain in Sikkim than there exists between the forms from various parts of the Malayan Archipelago which have been specifically named by Miquel. In some of its narrower-leaved forms this species runs into *F. pisifera*, Wall. The best distinction between the two lies in the receptacles, which in this species are larger and more scabrous. The leaves of this are also usually larger. The oldest name for this species is doubtless *F. coronata*, Reinw. Blume adopted Reinwardt's manuscript name, and gave a description of this plant, which, except as to the size of the fruit, agrees with his own species *obscura*. I retain the latter name, as no authentic type of Reinwardt's *coronata* exists, whereas of Blume's *obscura* there are types at Leiden.

Plate 102.—*F. obscura*, Bl. A, the form originally described by Blume: fruiting-branch, with mature receptacles. B, smaller leaved form: with young, much umbonate receptacles: *of natural size.*

Plate 103.—*F. obscura*, Bl. C. & D, the Indian form named *F. cyrtophylla* by Wallich—*of natural size.* 1, sessile male diandrous flower; 2, pedicellate monandrous flower; 3, gall

flower (from the same receptacle as No. 102); 4, fertile female flower with perianth; 5, fertile achene with the perianth removed: *enlarged.*

94. Ficus maduresis, *Miq. in Ann. Mus. Lugd. Bat.* iii. 222, 291.

A small tree, the young branches and young petioles with minute, stiff, adpressed hairs, ultimately glabrous, but always harsh and sub-scabrid. Leaves long-petiolate, oblanceolate, rather abruptly and shortly cuspidate, gradually narrowed from above the middle to the acute 3-nerved base; edges coarsely serrate; length of blade 6 to 9 in.; lateral primary nerves about 6 pairs, rather prominent below; the midrib with a few scattered adpressed-setose hairs, otherwise both surfaces quite glabrous; upper surface shining, under surface minutely punctate; petioles very faintly scabrid, 1 to 2 in. long; stipules (*fide* Miquel) subcoriaceous, ovate-lanceolate, nearly glabrous, about ·1 in. long. Receptacles shortly pedunculate, solitary, axillary, sub-globose, with few-bracted small umbilicus, glabrous but slightly scabrid, basal bracts absent; about ·4 in. across (yellowish red when ripe,—*fide* Miquel); peduncles smooth, ·3 in. long, with an obscure bract about the middle. Fertile female flowers sessile; perianth campanulate, 5-cleft; achene ellipsoid, smooth; style lateral. Male and gall flowers not seen.

Madura,—*De Vriese.*

This is closely allied to *copiosa,* but has axillary, not fascicled receptacles. It is a very little known plant, DeVriese's being the only specimens extant.

Plate 104.—Fruiting-branch of *F. Madurensis, Miq.* 1, apex of receptacle; 2, base of the same—*of natural size;* 3, fertile female perianth; 4, achene: *enlarged.*

95. Ficus mespiloides, *nov. spec.*

A tree; the young shoots with long, tawny, adpressed, rather stiff hairs, which are ultimately deciduous. Leaves rigid and rather harsh to the touch, sub-coriaceous, petiolate, elliptic, inequilateral; the apex shortly cuspidate; the edges entire, recurved; the base narrowed, cordate, or emarginate, sometimes oblique, 5- to 7-nerved; primary lateral nerves about 6 pairs, prominent beneath and, as well as the midrib, minutely adpressed-pubescent; the rest of the under surface puberulous and obscurely and minutely tuberculate; upper surface minutely lepidote, glabrous, rigid; length of blade 5 to 7 in.; petiole scurfy, and with a few scattered, adpressed, fibrous hairs, ·4 in. long; stipules ovate-acute, pilose externally ·4 in. long. Receptacles sessile, axillary, solitary, sub-globose (the base and apex truncate), the surface with many faint vertical ridges especially towards the apex, slightly; when young scurfy-pubescent; when mature nearly glabrous, an inch long by 1·3 in. broad; the umbilicus large, wide, surrounded by a rigid, but in no way projecting, annulus; basal bracts 3, leaving an annular scar where they fell off. Fertile female flowers ellipsoid, rather flat, smooth; the style long, terminal; perianth of 3 lanceolate dark-coloured free pieces. Male and gall flowers unknown.

New Guinea, on Mount Arfak,—*Sig. Beccari.* (Herb. Becc. P. P. 962.)

Plate 105.—Branch of *F. mespiloides,* King, with a mature receptacle. 1, receptacle; 2, stipule—*all of natural size;* 3, fertile female flowers: *enlarged.*

96. FICUS BREVICUSPIS, *Miq. Fl. Ind. Bat.* i. *pt.* 2. 315; *Ann. Mus. Lugd. Bat.* iii. 294.

A shrub; the young branches sparsely tubercular-hispid. Leaves petiolate, thickly membranous or sub-coriaceous, obovate-elliptic to elliptic-oblong, more or less suddenly narrowed to the shortly-cuspidate apex; edges lightly undulate, sub-denticulate, especially in the upper half; narrowed below the middle to the blunt, slightly emarginate, 5-nerved base; primary lateral nerves 7 to 12 pairs, pale-coloured and prominent beneath, as are also the midrib and secondary nerves; reticulations rather prominent, open; lower surface glabrous, but rather harsh to the touch (occasionally with a few scattered short hairs); upper surface glabrous, but hard and rigid; length of blade 4 to even 12 in.; petioles ·8 in. to 1·15 in., sub-scabrid; stipules linear, carinate, glabrous, ·75 in. long. Receptacles pedunculate, solitary, from the axils of leaves or of fallen leaves, globose; very much umbonate when young, tuberculate-hispid, about ·5 in. or more across (ripe receptacles unknown); basal bracts none; peduncles abut ·5 in. long, slender, hispid. Fertile female flowers pedicelled; the perianth 4-cleft; ovary elongate; style long, nearly terminal; stigma broad; the stigmas of all the flowers united into a concave disc. Male and gall flowers not seen.

Java,—*Teysmann;* the Andaman Islands, (King's Collector, No. 326.)

The affinities of this species are with *F. rudis*, Miq. On the type sheet of this in the Utrecht Herbarium there is written, in a hand unknown to me, *Ficus ulmifolia*, Lamk. Specimens of this are by no means common in collections. Specimens from the Andamans have much longer leaves than those from Java, but in other respects they agree with Miquel's type at Utrecht.

PLATE 106.—Branch of *F. brevicuspis*, Miq., with immature receptacles. 1, apex of an immature receptacle; 2, base of the same; 3, stipules—*of natural size;* 4, perianth of female flower; 5, immature fertile female pistil: *enlarged.*

97. FICUS BALICA. *Miq. Fl. Ind. Bat.* i. *pt.* 2. 314; *Miq. in Ann. Mus. Lugd. Bat.* iii. 294 (name only.)

A tree; the young shoots sparsely pubescent. Leaves long-petiolate, membranous, elliptic-oblong, slightly inequilateral; the apex shortly acuminate; the edges sub-entire, undulate, gradually narrowed from below the middle to the sub-acute, slighly-cordate, 3-nerved base; lateral primary nerves 8 or 9 pairs; secondary nerves straight, sub-transverse, all prominent and pale-coloured below; reticulations very minute, distinct on the under surface; both surfaces glabrous, but slightly asperulous; length of blade about 10 in.; petioles slender, asperulous, 1·75 in. to 3·75 in. Receptacles (young only seen) pedunculate, in pairs or fascicles of 3 or 4 from the axils of fallen leaves, depressed-globose, slightly umbonate at the apex, minutely hispid, about ·8 in. across when quite ripe; basal bracts none; peduncle slender, asperulous, ·6 in. long. Fertile female flowers (only known in the young state) with purple perianth, deeply 5-cleft; achene flattened; style lateral.

The Island of Bali, in the Malayan Archipelago.

A very distinct species, which is however, very imperfectly represented in collections. The figure I have given is drawn from the solitary specimen contributed by Miquel to the Herbariun at Kew.

Plate 107.—Two leaves and a fruiting-branch of *F. balica;* the receptacles immature. 1 & 2, more mature receptacles—*of natural size;* 3, fertile female perianth; 4, achene (young): *enlarged.*

98. Ficus rudis, *Miq. Ann. Mus. Lugd. Bat.* iii. 222, 291.

A small tree; the young branches covered with stiff, reddish-brown, deciduous hairs and scurf. Leaves unequally petiolate, thickly membranous (chartaceous), oblong-obovate; the apex rather abruptly and shortly cuspidate; narrowed towards the blunt or truncate, 3- to 7-nerved, emarginate or sub-cordate base; edges irregularly and coarsely—rarely finely—dentate; lateral primary nerves 3 to 6 pairs; lower surface minutely papillose and scabrid; when young the midrib, nerves, and veins are covered with rather long, stiff, rufous, deciduous hairs, the other parts being puberulous; upper surface minutely papillose, sub-scabrid, with scattered, adpressed, white stiff hairs, which disappear with age, leaving the surface almost smooth; midrib and primary nerves minutely hispid; length of blade 5 to 8 in.; petioles varying from ·5 to 2 in., hispid-hirsute, sometimes scurfy; stipules 2 to each leaf, ovate-lanceolate, hirsute externally along the midrib, about ·4 in. long. Receptacles unequally pedunculate, in fascicles of from 3 to 5 in the axils of leaves or of leaf-scars, globular, rather prominently umbonate, minutely but densely hispid, with several small triangular bracteoles scattered along their sides, but without basal bracts, about ·3 in. across; peduncles varying in length from ·4 to ·6 in., hispid-hirsute, with one or two minute scattered bracteoles along their length, and with several in a whorl at their bases. Male flowers monandrous; the perianth of 4 rather unequal pieces. Gall flowers with 6-cleft perianth; ovary sessile, smooth, with short lateral style and truncate stigma.

Celebes,—*Forster and Teysmann;* Celebes and Kei,—*Beccari.*

A species poorly represented in collections. *F. Gilapong,* Miq., and *F. serraria,* Miq. (Fl. Ind. Bat. Suppl. 426 and 428), two species described from very imperfect materials, are probably only forms of this larger and more hispid than typical *rudis.*

Plate 108.—Fruiting-branch of *F. rudis,* Miq. 1, lateral view of receptacle; 2, apex of receptacle—*of natural size;* 3, male flower; 4, gall flower from the same receptacle: *enlarged.*

99. Ficus copiosa, *Steud Nomencl.; Miq. in Ann. Mus. Lugd. Bat.* iii 271, 291.—*F. polycarpa,* Roxb. (not of Jacq., nor of Wall.), Fl. Ind. iii. 556; Wight's Icon 632; Miq. Pl. Jungh. 57; Fl. Ind. Bat. i. pt. 2. 300.—*F. muriculata,* Miq., Zoll. Syst. Verz. 93, 98; Fl. Ind. Bat. i. pt. 2. 299.

A shrub or small tree, with all its parts more or less sub-scabrous and hispid. Leaves petiolate, membranous, ovate-elliptic or obovate-elliptic, with acute apex and coarsely serrate or sinuate-serrate edges; narrowed towards the blunt, emarginate, 3- to 5-nerved, biglandular base; lateral primary nerves 5 to 8 pairs; lower surface scabrous from minute white harsh papillæ, often with numerous short, very deciduous, stiff hairs, which are most abundant on the midrib and nerves; upper surface hard, sub-scabrid, puberulous on midrib and nerves; length of blade 5 to 10 in.; petioles 1 to 4 in. long, sparsely hispid; stipules lanceolate, hirsute externally on the midrib, ·4 in. long. Receptacles pedunculate, in large fascicles from the axils of fallen leaves or from the older branches, globular to sub-pyriform, with rather large apical bracts, minutely verrucose, scabrous-hispid, ·4 in. across; basal bracts none; peduncles hispid, varying in length from ·4 in. to nearly 1 in. Male flowers with

3- or 4-cleft perianth, monandrous or diandrous. Gall flowers pedicelled, with 4-cleft perianth; ovary ovoid, smooth; style lateral; stigma cylindric.

Malayan Archipelago.

A variable and little understood species, very poorly represented in herbaria. One form may be separated as a variety.

VAR. MURICULATA. Primary nerves nearly horizontal; midrib, petioles, and young shoots muriculate.—*F. muriculata*, Miq.

Kurz collected in the Andamans a plant very like this, but with nearly smooth entire leaves, and with longer fruit borne on stout tubercles on the stem. He named this *macropoda* in his *Forest Flora of Burmah.* But in the absence of good specimens I hesitate to describe it as a distinct species.

Sig. Beccari has collected the typical form in Sumatra (P. S. 772), and the variety in the Moluccas.

PLATE 109.—Fruiting branch of *F. copiosa*, Miq. 1, piece of stem and branch with fascicles of receptacles; 2, part of branch with receptacles; 3, lateral view of a receptacle; 4, apex of receptacle; 5, vertical section of receptacle—*all of natural size;* 6, gall flower; 7, male monandrous flower; 8, male diandrous flower; 9, stamen: *enlarged.*

Leaves more or less oblong, tapering to both base and apex.

100. FICUS ROSTRATA, *Lamk. Encyc.* ii. 498; *Vahl. Enum.* ii. 200; *Miq. Fl. Ind. Bat.* i. *pt.* 2. 307; *Ann. Mus. Lugd. Bat.* iii. 274, 293.—*F. rostrata*, Lam? Bl. Bijd. 465.—*F. quercifolia*, Bl. non Roxb. Bijd. 468.—*F. radicans*, Roxb. Fl. Ind. iii. 536; Wight's Icon 671; Miq. Lond. Journ. Bot. vii. 428; Fl. Ind. Bat. i. pt. 2. 306; Ann. Mus. Lugd. Bat. iii. 278, 292.—*F. acuminata*, Kunth et Bouché Ind. Sem. Hort. Berol. 21.—*F. acuminata*, Herb. Ham. in Wall. Cat. 4478A to D.—*F. heteropleura*, Bl. Bijd. 466—*F. parietalis.* var. *ovalis*, Bl. Bijd. 462.—*F. saxatilis*, Bl. Bijd. 460?—*F. obtusidens*, Miq. Pl. Jungh. 59; Fl. Ind. Bat. i. pt. 2. 305.—*F. angulidens*, Miq. Fl. Ind. Bat. i. pt. 2. 310.—*F. raridens*, Miq. Lond. Journ. Bot. vii. 430; Fl. Ind. Bat. l.c. 309.—*F. Lobbii*, Miq. Lond. Journ. Bot. vii. 233; Fl. Ind. Bat. i. pt. 2. 305.—*F. uniglandulosa*, Wall. Cat. 4479.; Miq. in Lond. Journ. Bot. vii. 431; Ann. Mus. Lugd. Bat. iii. 277, 291; Fl. Ind. Bat. i. pt. 2. 309.

Scandent or creeping; the young branches and petioles scurfy, sub-scabrid when dry, and with the receptacles more or less harsh. Leaves alternate, membranous, sub-coriaceous, petiolate, narrowly oblong, elliptic or lanceolate, occasionally obovate-elliptic; apex with a long or short, often abrupt, entire cuspis; edges entire or subsinuate, or with a few coarse irregular teeth in the upper part; base always entire, gradually (rarely suddenly) narrowed, acute, or acuminate, strongly 3-nerved; lateral primary nerves 3 to 6 pairs, and, like the midrib and reticulations, strong and bold; upper surface glabrous and shining, the lower slightly pale, dull and harsh; length 2·5 to 8 in.; petioles ·25 to ·4 in., scurfy; stipules subulate, minute, ·15 in. long. Receptacles sub-sessile or pedunculate, in the axils of leaves or from the axils of the scars of fallen leaves, in pairs or fascicles of 4 to 6, scabrid-hispid, without basal bracts, ovoid and boldly umbonate when young; when ripe globose, reddish-yellow, from ·2 to ·3 in. across; peduncles hispid-hirsute, from ·05 to ·4 in. long.

Male flowers with perianth of 3 lanceolate pieces; the anther narrow, elongate, its filament as long as itself. Gall flowers with short perianth of 3 pieces; the ovary globular, smooth; style short, lateral. Fertile female flowers with gamophyllous perianth, 2- or 3-partite; the achene ovoid, emarginate on one side; style lateral, nearly as long as the achene; stigma cylindric.

Tropical forests, at the bases of the Khasia Hills in the Chittagong and Burmese ranges. Not uncommon. In the Malayan Peninsula and Archipelago very common and rather variable, but by no means so variable as to warrant the swarm of specific names which forms of it have received from various authors.

Typical *rostrata*, Lamk., has sessile receptacles; the receptacles of the form which Roxburgh called *radicans* have peduncles from ·5 to ·75 in. long. The differences amongst the Malayan forms which Blume and Miquel elevated to the rank of species are, on the whole, inconsiderable; and Miquel himself, in his final revision of the genus, reduced four of his own species to *F. rostrata*, Lamk. In the form named *uniglandulosa* by Wallich the ripe receptacles are nearly glabrous. I think it probable that *F. pisifera*, Wall. (as I have mentioned under that plant) is only a form of this. *F. urophylla*, Wall., is likewise very closely allied to this. In external characters this and *F. urophylla* are almost identical, the only differences which I can see being that the leaves of *urophoylla* are more coriaceous, and the peduncles of the receptacles are shorter than those of *radicans*. But *urophylla* is never scandent; it is always a shrub, and occasional plants of it form trees 30 ft. high. *F. radicans*, however, has strictly monandrous male flowers, with very slight 3-cleft perianth, which is sometimes altogether absent. The male florets of *urophylla*, on the other hand, have a 4 cleft perianth, and each contains a perfect stamen and an abortive pistil; and on account of this pistil it falls into the section *Palæomorphe*.

PLATE 110.—*F. rostrata*, Lamk. A, B, C, three forms of leaves. 1, apex of mature receptacle; 2, base of the same; 3, stipules—*of natural size;* 4, male flower; 5, gall flower—*from the same receptacle;* 6, perianth of perfect female flower; 7, ripe achene of the same: *enlarged.*

101. FICUS CLAVATA, *Wall. Cat.* 4495; *Miq. in Lond. Journ. Bot.* vii. 431; *Ann. Mus. Lugd. Bat.* iii. 275.—*F. trachycarpa*, Miq. l.c. 430; Brandis For. Flora 421.—*F. caudata*, Wall. Cat. 4494A; Miq. in Lond. Journ. Bot. vii. 431; Ann. Mus. Lugd. Bat. iii. 275.—*F. chincha*, Roxb. Fl. Ind. iii. 534?

An erect shrub, the young branches scabrid. Leaves petiolate, membranous, slightly inequilateral, oblong-lanceolate or oblanceolate; apex abruptly acuminate or caudate; edges of the upper half irregularly sinuate-dentate, of the lower half entire; base acute or acuminate, sometimes obscurely 5-nerved; lateral primary nerves 4 to 6 pairs, prominent on the lower surface, as are also the veins and reticulations; both surfaces glabrous, but hard and rather harsh to the touch, lower surface minutely punctate; length 4 to 5 in.; petioles ·2 to ·3 in. long; stipules lanceolate, ·3 in. long, very caducous. Receptacles short-pedunculate, axillary, solitary, obovate, or sub-globular, constricted at the base (strongly umbonate, especially in the obovate forms); umbilical scales sometimes large, more or less scabrid, often verrucose, occasionally smooth; yellow when ripe, and in diameter from ·35 in. in the sub-globular to ·5 in. in the obovate forms; basal bracts minute; peduncles from ·1 in. to ·2 in. long. Male and gall flowers mixed over all parts of the interior of the same receptacle; the perianth of both gamophyllous, divided above into five or six segments, pedicellate; male with one stamen, the anther large, broadly ovate. Fertile female flowers in smaller receptacles and on different plants from the former, sessile; the perianth campanulate, with five narrow, unequal teeth; the achene ovoid, slightly papillose; the style sub-terminal, elongate; stigma cylindric.

On the lower slopes of the Himalayas, from the Sutlej valley eastward to Bhotan; in the Khasi and Burmese Hills, at elevations of from 1,000 to 4,500 ft.; also in Malacca,—*Griffith.*

Two forms of receptacle occur in this species: the large obovate, clavate, smooth, or wrinkled; and the ovoid or sub-globular, scabrid, often wrinkled receptacle. The former is the receptacle of typical *F. clavata*, Wall.; the latter is that of *F. caudata*, Wall., *F. trachycarpa*, Miq., and probably of *F. chincha*, Roxb.

There is no absolute sexual relation between the external form and the contents of the two kinds of receptacle which occur in this species, but, so far as I have observed, the large obovoid clavate receptacles invariably contain male and gall flowers; and the males are not confined to a zone near the mouth, but are to be found at all parts of the interior of the receptacle. Of the small ovoid or sub-globular receptacles, on the other hand, some are exclusively filled with fertile female flowers, while others (like the large clavate receptacles) contain males and gall flowers mixed together.

Plate 111.—*F. clavata*, Wall. A typical form, with large clavate receptacles—*of natural size.* 1, male flower with one stamen; 2, gall flower: *enlarged.*

B.—The form with globular receptacles. 3, apex of receptacle; 4, base of the same; 5, stipules—*of natural size;* 6, perianth of fertile female flower; 7, fertile achene: *enlarged.*

102. Ficus cuspidata, *Reinw. in Bl. Bijd.* 464; *Miq. in Lond. Journ. Bot.* vii. 429; *Fl. Ind. Bat.* i. *pt.* 2. 308. t. 19; *Ann. Mus. Lugd. Bat.* iii. 274, 292.—*F. tenuiramis*, Kunth et Bouché Ind. Sem. Hort. Berol. 21; Miq. Lond. Journ. Bot. vii. 432.—*F. angustifolia*, Bl. Bijd. 463.—?*F. fallax*, Miq. Fl. Ind. Bat. i. pt. 2. 308; Miq. in Ann. Mus. Lugd. Bat. iii. 292.

A small tree or shrub, never scandent or creeping; the branches very thin. Leaves short-petiolate, membranous, sub-coriaceous, lanceolate-elliptic (or narrowly oblong in var. *sinuata*), sometimes inequilateral, more or less gradually tapering at the apex to a very long, straight, linear acumen; edges entire (sinuate in var. *sinuata*), often revolute; base 3-nerved, acute, or acuminate; lateral primary nerves 6 to 8 pairs, almost exactly at right angles to the midrib, prominent; reticulations minute, distinct; both surfaces glabrous, the upper shining, the lower pale dull, minutely punctate, slightly sub-scabrid; length 3 to 5·5 in.; petioles ·15 in. to ·25 in., sometimes slightly scurfy; stipules much convolute, subulute, ·25 to ·35 in. long. Receptacles in fascicles in the axils of the leaves, sessile or short-pedunculate, ovoid, umbonate or sub-globose, slightly scabrous, reddish when ripe, and about ·15 to ·2 in. long, without basal bracts; peduncles from ·05 to ·15 in. long, slender, nearly glabrous, with a large, nearly glabrous, bract about the middle and several at the base. Male flowers numerous, the perianth of 3 or 4 lanceolate hyaline pieces; stamen 1 (sometimes 2), short, broad, nearly sessile. Gall flowers with perianth of 3 linear-lanceolate pieces; the ovary stipitate, ovoid, smooth, with short lateral style. Fertile female flowers with perianth of 2 or 3 hyaline pieces; achene ellipsoid, emarginate on one side, with a hyaline edge at the opposite side; style lateral; stigma dilated.

Java and Sumatra, from 2,500 to 5,000 ft.

Closely allied to *F. rostrata*, Lamk., but with the primary lateral nerves more horizontal, the figs smaller and more ovoid, and the branchlets thinner. This species apparently is never climbing or creeping. Zollinger (quoted by Miquel in *Ann. Mus. Lugd. Bat.* iii. 274) describes this as a large tree. Forbes and other collectors say it is a small tree or bush.

VAR. SINUATA. Leaves larger than typical form, narrowly oblong, the margins sinuate or lobed.

Perak,—King's Collector, 7256.

This variety appears in several collections under the name *F. variabilis*, Miq., and I have seen specimens so named by Miquel's own hand. But this does not in the least agree with his own description of his species *variabilis* (Fl. Ind. Bat. i. pt. 2. 310). In Ann. Mus. Lugd. Bat. iii. 292 (sub No. 235) Miquel reduces *F. renitens* to *variabilis*. But his description of *F. renitens* (Fl. Ind. Bat. i. pt. 2. 316) shows *renitens* to be nothing like this, but to be *variabilis*, Wall. This plant has therefore been erroneously named *variabilis*, Miq. by Miquel himself.

PLATE 112.—A, branch of *F. cuspidata*, Reinw., with mature receptacles; B, twig of a form with broader, more suddenly caudate-acuminate leaves; C, leaf of *var. sinuata.* 1, receptacle; 2, apex of the same; 3, stipule—*all of natural size;* 4, male flower; 5, gall flower; 6, fertile female flower; 7, perfect achene from fertile female flower: *all enlarged.*

103. FICUS SIKKIMENSIS, *Miq. Ann. Mus. Lugd. Bat.* iii. 225, 292.—*F. caudata*, Herb. Ind. Or. Hook. fil. and T. Thoms. (non Wall.).—*F. salicifolia*, Miq. (non alior.) Lond. Journ Bot. vii. 431; Ann. Mus. Lugd. Bat. iii. 292.

A small tree with pendulous branches, sometimes epiphytal; the young branches, petioles, and receptacles puberulous, ultimately all parts glabrous. Leaves membranous, shortly petiolate. sometimes slightly inequilateral, oblong-elliptic, lanceolate or oblanceolate, suddenly narrowed at the apex into a short, rather blunt acumen; edges quite entire, gradually narrowed to the acute or acuminate sub-3-nerved base; lateral primary nerves 5 to 6 pairs, and, like the midrib, pale and prominent beneath; lower surface paler than the upper, minutely punctulate; length of blade 2·5 to 5 in.; petioles rather thick, succulent (scurfy when dry), from ·2 to ·3 in. long; stipules linear-subulate, from a broad base, convolute, curved, diverging from the axils, about as long as, or occasionally twice as long as, the petioles. Receptacles shortly pedunculate, solitary, or in pairs or fascicles of 3 to 4 from short axillary tubercles, globose or ovoid-globose, slightly mammillate, smooth, but with a few elongated whitish warts, and near the apex an occasional whitish scale; basal bracts none; when ripe reddish in colour and about ·15 in. across; peduncles about ·1 in. long, with a few minute bracts near the middle or at the base. Male flowers with a hyaline perianth of 3 pieces and a single stamen; the anther ovoid, the filament having a process at its base. Gall flowers with an ovoid shining achene and short, tubular, lateral style. Fertile female flowers in different receptacles from the males, and in different plants; the perianth hyaline, gamophyllous, with 3 long teeth; achene with hyaline border all round it; style short; stigma cylindric, not tubular.

Forests in the valleys of the Eastern Himalaya and Khasi Hills, at from 2,000 to 4,000 ft. above the sea.

This is in most respects a miniature of *F. subulata*, Bl., and I have great doubt about the propriety of separating it specifically from that plant. Typical *subulata*, Bl., occurs both as an epiphytic climber and as a shrub growing in soil; it is not found north of Chittagong. This species, on the other hand, is not found so far south as Chittagong, and is usually a small tree growing in soil; but it is occasionally epiphytal. I think on the whole this may be merely a northern form of *F. subulata*, Bl. The type specimens of *F. salicifolia*, Miq., collected by Jenkins in the Eastern Himalaya are at Kew, and they differ in no respect from specimens in Herb. Ind. Or. Hook. fil. and Thoms. issued as *F. caudata*, Wall., which form the basis of Miquel's more recently described *F. Sikkimensis*. The latter name, however, must be retained for this plant, that of *F. salicifolia* being pre-occupied by a species of Vahl. This plant also comes near to *F. cuspidata*, Reinw.

PLATE 113.—*F. Sikkimensis*, Miq. Two fruiting-twigs. 1, apex of receptacle; 2, base of the same; 3, bracts at base of peduncle; 4, stipules—*all of natural size;* 6, male flower with 3-leaved perianth and 1 stamen; 7, gall flower from the same receptacle as the male flower; 8, perianth of fertile female flower; 9, fertile achene: *all enlarged.*

104. FICUS AMPELAS, *Burm. Fl. Ind.* 226 (*Excl. Syn. Rheede*).—*F. ampelas*, Lamk., Bl. Bijd. 473; Miq. in Lond. Journ. Bot. vii. 428; Zoll. Syst. Verz. 93; Fl. Ind. Bat. i. pt. 2 303; Ann. Mus. Lugd. Bat. iii. 272, 292.—*F. politoria*, Lamk.? Bl. Bijd. 472.—*F. rubicaulis*, Decais. N. Ann. Mus. iii. 496.—*F. bandana*, Miq. Fl. Ind. Bat. i. pt. 2. 301.—*F. javensis*, Miq. Lond. Journ. Bot. vii. 232 partly (*fide* Miquel).—*F. grewiæfolia*, Bl. Bijd. 475 (in part); Miq. Fl. Ind. Bat. i. pt. 2. 306, and in Ann. Mus. Lugd. Bat. iii. 273, 292 (in part).

A small tree, often epiphytal and scandent, all parts rough and harsh. Leaves of a hard brittle texture, shortly petiolate, variable in shape, unequal sided, narrowly ovate-elliptic or lanceolate to oblanceolate; apex acute or rather bluntly acuminate; edges sub-entire, serrate or crenate in the upper three-fourths, entire at the narrowed, unequal, 3-nerved, acute or obtuse base; from 2·5 to 3 in. long; lateral nerves 4 to 6 pairs, rather prominent below and like the midrib very shortly hispid on both surfaces; the rest of the lower surface pale and dull, tuberculate, scabrous but not hispid when old; upper surface shortly hispid when young, ultimately glabrous, shining, hard and harsh, sub-scabrid; petioles ·2 in. long; stipules subulate-lanceolate, ·25 in. long. Receptacles shortly pedunculate, axillary, in pairs, sometimes solitary or in fascicles, globose, mammillate when young, with wide, occasionally apert umbilicus, ·15 to ·2 in. across, densely covered with small harsh papillæ and with very short hispid hairs, with occasionally 1 or 2 verruciform bracts on the sides, or near the base, or along the peduncles; peduncles hispid, from ·1 to ·2 in. long. Fertile female flowers sessile; perianth of 4 pieces; achene on a flattened stalk; style lateral, much elongate; stigma hooked. Male and gall flowers not seen.

Widely distributed in the Malayan Archipelago, but apparently absent from the Peninsula.

Rather variable as to shape of leaf and as to the cutting of the edges, but singularly unvarying as to texture and surfaces of the leaves, which are of a dark colour when dry and shining and hard to the touch above, even after all the hairs have disappeared. The lower surface is pale, dull, minutely papillose and scabrous. Perfect female flowers occur in every receptacle, but I have never been able to find male or gall flowers in any receptacles of any of the forms that fall under this. On the other hand I have never been able to find perfect female flowers in any receptacle of *F. asperior*, Miq. In that species only male flowers and gall flowers have ever been seen by me. The leaves of the plants known as *ampelas*, Bl., and *asperior* agree as to texture, and they differ but little in shape. The leaves of *ampelas* are, however, entire, and those of *asperior* are coarsely serrate. But this is a very slight difference, and I believe it not unlikely that *asperior* may be really the male, and *ampelas* the female, of one and the same species. Observations in the field are required to settle this, and in the meantime it may be convenient to keep up the species.

PLATE 114.—Fruiting-branch of *F. ampelas*, Burm. 1, apex of receptacle; 2, base of ditto; 3, stipules 1—*of natural size;* 4, perfect female flower: *enlarged.*

105. FICUS UMBONATA, *Reinw. in Bl. Bijd.* 454 (*not of Wall.*), *Miq. in Ann. Mus. Lugd. Bat.* iii. 297.—*Covellia umbonata*, Miq. Fl. Ind. Bat. i. pt. 2. 323.

A shrub, the young branches densely adpressed-pilose, rather scabrid. Leaves alternate or opposite, petiolate, coriaceous, narrowly elliptic, oblong or oblanceolate, inequilateral; the apex shortly acuminate; edges sub-crenate, undulate towards the apex, entire towards the slightly narrowed, unequal, 3- to 4-nerved base; primary lateral nerves about 7 pairs; under surface with the reticulations distinct, minutely tuberculate, adpressed-pilose, especially on the midrib and nerves, sub-scabrid; upper surface sparsely adpressed-pilose; length of blade about 3·5 in.; petiole adpressed-pilose, ·4 in.; stipules lanceolate, nearly glabrous, ·4 in. long. Receptacles shortly pedunculate, axillary, depressed-globose, adpressed-pilose, scabrid, ·6 in. across; basal bracts none; peduncle ·1 in. long. Male flowers pedicellate; the perianth of 3 broadly ovate distinct pieces; stamen 1, nearly sessile. Gall flower with a gamophyllous perianth, 3-cleft at the mouth; ovary smooth, ovoid; style short, thick, lateral; stigma dilated. Fertile female flowers unknown.

Moluccas,—*De Vriese, Beccari.*

I have seen this only in the Royal Herbarium at Leiden and in Sig. Beccari's superb Malayan Herbarium.

PLATE 115A.—*F. umbonata,* Reinw., branch with mature receptacles. 1, apex of a receptacle; 2, base of the same; 3, stipules—*all of natural size;* 4, male flower in bud; 5, the same expanded; 6, gall flower: *enlarged.*

106. FICUS ASPERIOR, *Miq. in Ann. Mus. Lugd. Bat.* iii. 291.—*F. exasperata*, Roxb. (non Vahl.), Fl Ind. iii. 555; Wight's Icon 664.

A tree (*fide* Roxburgh), the young shoots scabrous. Leaves petiolate, membranous, oblong or elliptic; the apex acuminate; the edges coarsely sinuate-serrate; the base slightly narrowed, 3-nerved, biglandular; primary lateral nerves about 6 pairs, thin, but rather prominent beneath, as are also the rather straight connecting nerves; under surface scabrid and with a few short stiff hairs; upper surface scabrid rugose; length of blade 4 to 6 in.; petiole ·35 in., scabrid; stipules lanceolate, ·3 in. long, fugaceous. Receptacles pedunculate, in pairs, axillary, sub-globose, scabrid-hispid, ·2 in. across; the umbilicus rather prominent; basal bracts none; peduncles with one or two scattered bracteoles, scabrid, ·25 in. long. Male flowers with 1 stamen; the perianth of 4 pieces. Gall flower with a similar perianth; achene ovoid; style short, lateral.

AMBOINA.

This species was introduced from Amboina into the Botanic Garden, Calcutta, by Roxburgh during the year 1798. It was described by him as *exasperata*, a name pre-occupied by an African plant described by Vahl. The species is now known only by a few specimens collected in the Calcutta Garden and named in Roxburgh's own handwriting, and by a manuscript drawing at Calcutta executed under Roxburgh's supervision. This, as I have explained under *F. ampelas*, is, I believe, probably only the form of that species in which male flowers are developed. The males of this are, as usual, associated with gall flowers. The plant which Wallich issued as No. 4521 of his Catalogue and as *F. exasperata*, Roxb., is nothing but *F. scabrella*, Roxb., a species which I have reduced to *F. heterophylla*, Linn. fil.

PLATE 116.—Branch of *F. asperior*, Miq., with immature receptacles. 1, a mature receptacle; 2, apex of the same; 3, basal bracts—*of natural size;* 4, male flower; 5, gall flower from the same receptacle: *enlarged.*

Leaves narrowly linear-lanceolate: small trees.

107. FICUS IRREGULARIS, *Miq. Ann. Mus. Lugd. Bat.* iii. 224, 292.

A small tree with pendulous habit, all parts quite glabrous. Leaves shortly petiolate, linear-lanceolate, elongate, occasionally dilated or sinuate on one or both sides towards the base; margins quite entire; tapering very gradually to the apex, less so to the base, which is cuneate, acute, or acuminate, glandular, and obscurely 3-nerved; lateral primary nerves 20 to 25 pairs, quite horizontal, straight; length of blade 3 to 4·5 in.; petioles from ·2 in. to ·3 in.; stipules rather longer than the petioles, subulate. Receptacles unequally pedunculate, fascicled, in pairs or on short axillary minutely multi-bacteolate tubercles, sub-globose, sub-umbonate, smooth, ebracteate at the base; yellow when ripe and ·2 in. across; peduncles slender, from ·1 in. to ·2 in. long. Male and gall flowers unknown. Fertile female flowers with a perianth of 5 spathulate hairy pieces; fertile achene oblong, hispid; style lateral.

Celebes,—*Teysmann.*

Cultivated in the garden of the palace of the Sultan at Johore, where I have seen it growing. It is a most charming little tree, with a singularly graceful weeping habit. This species is but poorly represented in Herbaria.

PLATE 117.—A, fruiting-branch of *F. irregularis*, Miq. B, twig of a form with sinuate leaves. 1, receptacle seen from the side; 2, apex of receptacle; 3, stipule—*of natural size;* 4 perianth of fertile female flower; 5 & 6, fertile achenes: *enlarged.*

108. FICUS CUMINGII, *Miq. Lond. Journ. Bot.* vii. 235; *Ann. Mus. Lugd. Bat.* iii. 292.

Young shoots, petioles, peduncles, and under surface of the midrib adpressed-hispid. Leaves sub-opposite, shortly petiolate, narrowly lanceolate, gradually narrowed above into a bluntish acumen; edges remotely serrate-dentate, occasionally with a triangular lobe near the base at one or both sides; base rounded, 3-nerved; lateral primary nerves very numerous, transverse, prominent; both surfaces, but especially the lower, scabrid; length 2·5 to 4 in.; petioles ·15 in. long, scabrous. Receptacles shortly pedunculate, axillary, or in pairs, globose, about ·25 in. across, scabrous; the umbilicus rather prominent; basal bracts 3, minute; pedicels about the length of the petioles.

Philippines,—*Cuming*, 1925.

The type of this is at Kew. I have seen no other specimen.

Plate 118.—Fruiting-branch of *F. Cumingii*, Miq.—*of natural size.* 1 & 2, receptacles showing the umbilicus and apical bracts; 3, basal bract of receptacle. Nos. 1 to 3 are much enlarged.

Leaves very large (15 *to* 20 *inches long*), *with more or less rufescent pubescence.*

109. Ficus decipiens, *Reinw. in Bl. Bijd.* 479; *Miq. Fl. Ind. Bat.* i. *pt.* 2. 297; *Miq. in Ann. Mus. Lugd. Bat.* iii. 291.

A shrub (*fide* Blume); the leaves 15 to 20 in. long, shortly petiolate, membranous, panduriform, coarsely and unequally inciso-dentate, the teeth ciliate; apex shortly acuminate; base truncate, sub-cordate, 7-nerved; upper surface scabrid, with many white, adpressed, stiff hairs; under surface, and especially the main nerves and midrib, rufescent, setose; lateral nerves about 7 pairs; petiole about ·5 in. stout, setose like the midrib; stipules ovate-lanceolate, setose, especially on the midrib and at the edges. Receptacles axillary, sessile, ovoid with mammillate apex, about 1 in. long; basal bracts 5 to 6, ovate-lanceolate.

Celebes,—*Reinwardt*, Herb. No. 1547.

A most remarkable species, of which very few specimens exist. The drawing here given was copied by the kind permission of Drs. Suringar and Boerlage from a figure in the Herbarium at Leiden.

Plate 121.—1, leaf of *F. decipiens*, Reinw.; 2, apical bud showing stipules and a young leaf; 3, stipules—*all of half natural size*; 4, view of a receptacle showing the mammillate apex; 5, ditto showing the 6-bracted base; 6, transverse section of receptacle—*slightly enlarged*; 7, fertile female flowers? in various stages: *considerably enlarged.*

110. Ficus pungens, *Reinw. in Bl. Bijd.* 478; *Miq. Fl. Ind. Bat.* i. *pt.* 2. 296 *Miq. in Ann. Mus. Lugd. Bat.* iii. 291.

A tree, everywhere ferruginous-tomentose or hispid. Leaves petiolate, membranous, broadly ovate, elliptic or obovate-elliptic; apex acute; the edges regularly and finely dentate; the base deeply cordate, often much narrowed, 3- to 5- or even 7-nerved; lateral primary nerves about 8 pairs; upper surface scabrid and shortly and deciduously hispid; the midrib and nerves with brownish white pubescence; lower surface shortly hispid; the midrib and primary nerves ferruginous-tomentose; length of blade 8 to 14 in.; petioles stout, tomentose, about 1 in. long; stipules large, ovate, acuminate, much convolute, more or less setose externally, 1·5 in. long. Receptacles almost sessile, solitary, axillary, globose, densely ferruginous-tomentose, about ·8 in. across; umbilical scales large; basal bracts 3, ovate.

Moluccas,—*Reinwardt;* Ternate, *Beccari.*

A plant of which I have seen good specimens only in the magnificent Malayan Herbarium of Signor Beccari.

Plate 122.—*F. pungens,* Reinw. Branch with nearly mature receptacles. 1, mature receptacle; 2, base of the same; 3, stipules; 4, basal bract: *all of natural size.*

Perianth of the flowers ciliate; the interior of the receptacle hispid; receptacles axillary.

111. Ficus melinocarpa, *Bl. Bijd* 460; *Miq Fl. Ind. Bat.* i. *pt.* 2. 302; *Suppl.* 173, 427.—*F. obliqua,* Miq. in Zoll. Syst. Verz. 98; Ann. Mus. Lugd. Bat. iii. 273, 292.

A moderately-sized (40 to 50 ft. high), hispid-tomentose tree. Leaves petiolate, membranous, often unequal in size and inequilateral, broadly ovate or elliptic, with sub-acute apex, entire edges, and 3 to 5-nerved, glandular, broad, rounded, slightly cordate, sometimes unequal base; length of blade from 4 to 7 in.; lateral nerves from 3 to 8 pairs; the lower surface minutely hispid-tuberculate; upper surface shortly hispid-scabrous; the midrib and nerves tomentose on both surfaces; petioles from ·6 to ·8 in., tomentose; stipules ovate-lanceolate, hirsute, ·3 in. to ·7 in long. Receptacles pedunculate, axillary, in pairs or solitary, or in fascicles below the leaves; globular or turbinate, with prominent, nearly glabrous, umbilical scales and 3 broad, acuminate, small basal bracts; when ripe, yellow (*fide* Zollinger), minutely hispid, almost glabrescent, about ·4 to ·6 in. across; peduncles ·3 in. long, shortly hispid. Male flowers sessile, monandrous; the perianth of 3 distinct pieces. Gall flowers stipitate; the perianth of 6 pieces; achene smooth, ovoid; the style sub-terminal. Fertile female flowers pedicellate; the perianth of 3 distinct pieces, which have tufts of hair at their apices; achene and style lateral; stigma dilated.

Preanger province in Java; Lampongs in Sumatra.

A distinct and apparently rather local species.—*F. scabra,* Forst. Seem. Fl. Vit. 249, appears to me to be little more than a form of this.

Plate 119.—*F. melinocarpa,* Bl. Branch with mature receptacles. 1, apex of receptacle; 2, stipules—*of natural size;* 3, male flower; 4, gall flower; 5, fertile female flower: *enlarged.*

112. Ficus Riedelii, *Teysm. Mss.; Miq. in Ann. Mus. Lugd. Bat.* iii. 223, 292.

A small hispid-tomentose tree, the young branches rufescent. Leaves shortly petiolate, thickly membranous (almost coriaceous), oblong lanceolate or narrowly oblong-elliptic, rarely ovate-elliptic, often inequilateral; apex usually suddenly and shortly acute or acuminate; edges sub-entire or remotely serrate; base rounded, sometimes emarginate, slightly oblique, 5 nerved (2 of the nerves minute); lateral primary nerves 3 to 5 pairs; the whole of the under surface minutely tuberculate, the midrib, nerves, and veins shortly hispid; upper surface sparsely hispid, very scabrous from rough points; midrib and veins hispid-hirsute; petioles hispid-hirsute, stout, about ·3 in. long; stipules lanceolate-hirsute, small. Receptacles very shortly pedunculate or sessile, axillary, solitary (rarely in pairs), ovoid to sub-globose, umbonate when young, densely and completely covered with long stiff tawny tomentum, bearing a number of lanceolate-subulate bracts irregularly distributed along their sides, but especially towards the apex and at the umbilicus; basal bracts none; when ripe yellow, ·5 in. (to ·75 in. ?) across; pedicels, when present, thick, densely tomentose, about ·1 or ·2 in. long. Male flowers stipitate or sub-sessile, monandrous; the perianth of 5 lanceolate hairy pieces. Gall flowers stipitate; the perianth like that of the males; achene sub-globose, shining; style lateral; stigma bifid. Fertile female flowers unknown; receptacle with hispid hairs, which surround the flowers.

Moluccas and Celebes,—*Teysmann.*

The receptacles in the majority of the specimens which I have seen are only about half an inch across; but in the Leiden Herbarium there is a detached receptacle, said to belong to this species (and apparently rightly), which is more than three-quarters of an inch across.

PLATE 120.—A, fruiting-branch of *F. Riedelii*, Teysm., narrow-leaved form; B, leaf of broad-leaved form—of *natural size.* 1 & 2, vertical sections of receptacles; 3, stipitate male flower : 4, gall flower : *enlarged.*

Covellia.—*Flowers unisexual; male flowers in the same receptacles as the gall flowers, monandrous, the perianth of 3 or 4 distinct pieces: female flowers in separate receptacles from the males and galls, pedunculate or sessile; the perianth gamophyllous, much shorter than the ovary, or wanting (rarely consisting of 4 or 5 pieces); the receptacles on long sub-leafless branchlets issuing from near the base of the stem, often sub-hypogæal, or on shortened branchlets (tubercles) from the stem and larger branches, or axillary; shrubs or trees, never epiphytes or climbers.*

Receptacles on sub-leafless branches, which issue from near the base of the stem; leaves alternate (except in botryocarpa).

Receptacles larger than a pea.

Leaves more or less scabrid or hispid-pubescent.

Receptacular branches short, much ramified, leaves broad.

Leaves broadly ovate, receptacles crowded . . . . 113. *F. conglobata.*

„ ovate-elliptic, slightly unequal at the base; receptacles sparse . . . . 114. *F. Vriesiana.*

Receptacular branches long, little ramified; leaves narrow, elongate.

Leaves very unequal at the base.

Receptacles vertically ridged . . . . 115. *F. hypogæa.*

Receptacles not vertically ridged

Receptacles shortly hispid and verrucose when ripe . . . . 116. *F. cunea.*

„ tomentose when ripe . . . . 117. *F. geocarpa.*

Leaves narrowed towards, but not unequal at, the base.

Receptacles turbinate or sub-globular.

Receptacles sub-globular, with numerous fleshy bractlets on their sides . . . . 118. *F. Beccarii.*

Receptacles turbinate, their sides with numerous smooth flat warts, but no bractlets . . . . 119. *F. conora.*

Receptacles ellipsoid or obovate.

Leaves dentate . . . . 120. *F. stolonifera.*

Leaves entire.

Apices of leaves acute . . . . . . 121. *F. Arfakensis.*
„ caudate-acuminate . . 122. *F. Treubii.*

Leaves glabrous, or nearly so.

Receptacles on long, thin, little-divided branches.

Leaves quite glabrous at all times . . . . 123. *F. prostrata.*
Leaves almost glabrous when adult; pubescent when young . . . . 124. *F. brachiata.*

Receptacles on short, rather stout, branches.

Leaves suddenly acuminate at the apex; primary nerves 6 to 8 pairs, nearly transverse . . . . 125. *F. Miquelii.*
Apices of leaves gradually narrowed to an acute apex; primary nerves 5 or 6 pairs, oblique . . . . 126. *F. botryocarpa.*

Receptacles pisiform.

Leaves large, broadly ovate, with deeply cordate bases.

Receptacles in fascicles . . . . 127. *F. myriocarpa.*
Receptacles in dense rounded capitules . . . . . 128. *F. Minahassæ.*

Leaves large, elliptic-lanceolate, about 12 inches long, their bases narrowed.

Receptacles in dense fascicles on the larger root-branches 129. *F. stipata.*
Receptacles in lax fascicles or racemes on the smaller root-branches . . . . 130. *F. Forbesii.*

Leaves small, less than 4 inches long.

Leaf margin entire . . . . 131. *F. ribes.*
„ serrate . . . . 132. *F. cuneata.*

Receptacles on shortened branchlets (tubercles) from the stem and larger branches, never from the axils of the leaves; leaves alternate.

Receptacles dimorphous (of different forms on the same individual) . 133. *F. dimorpha.*

Receptacles of one form.

Leaves narrowly oblong, the apex produced into a long narrow tail, the base auriculate . . . . 134. *F. Hemsleyana.*
Leaves obovate-ellipitic, the base not auriculate; receptacles ridged . . . . 135. *F. Scortechinii.*

Leaves ovate-elliptic, the base not auriculate.

Receptacles with bracts on their sides . . . . . . 136. *F. Harlandi.*
Receptacles without bracts on their sides . . . . . 137. *F. condensa.*

Receptacles in the axils of the leaves, or in fascicles from the stem or larger branches; the leaves alternate or opposite.

Receptacles dimorphous (of different forms on different individuals). 138. *F. fistulosa.*

Receptacles of one form.

Leaves narrowly lanceolate, opposite; receptacles sub-globular, axillary . . . . 139. *F. sæmocarpa.*

Leaves ovate-elliptic, opposite or alternate; receptacles obpyramidal . . . . 140. *F. obpyramidata.*

Leaves alternate or opposite; receptacles both from axils of leaves and on tubercles from the stem on the same individual . . 141. *F. hispida*

Leaves alternate or sub-opposite, obovate-elliptic; receptacles axillary, verrucose, their sides bracteolate . . . . 142. *F. lepicarpa*

Leaves opposite or alternate, glabrous, ovate or elliptic; receptacles always axillary; latex yellow . . . . 143. *F. leucantatoma.*

Receptacles on sub-leafless branches which issue from the base of the stem; leaves alternate, except in No. 126.

113. FICUS CONGLOBATA, *nov. spec.*

A small, very hispid tree. The leaves opposite or alternate, membranous, long-petiolate, elliptic, sometimes sub-obovate-elliptic; apex acuminate; edges minutely serrate or dentate; the base rounded or sub-emarginate, slightly unequal, 5-nerved; primary lateral nerves 4 pairs, prominent below and, like the midrib and secondary nerves and reticulations, shortly setose; the rest of the lower surface minutely papillose; upper surface sparsely adpressed-hispid; the midrib and primary lateral nerves tomentose-hispid; length of blade 6 to 14 in.; petioles 1·5 to 6 in., setose; stipules ovate-lanceolate, adpressed-hispid, ·75 in. long. Receptacles numerous, crowded on short, but very-much divided, glabrescent, tubercled branches which issue from the stem near its base; long pedunculate from the axils of small scarious bracts; pyriform or sub-globular, nearly smooth, ·5 in. across; the umbilical scales large; basal bracts 3, large, united at the base, glabrous; peduncle smooth, nearly 2 in. long. Male flowers pretty numerous near the mouth of the receptacle containing galls; the perianth of 3 large, broad, concave pieces which form a loose sac round the single stamen; anther broadly ovate, emarginate at both base and apex. Gall flowers with or without a very short gamophyllous perianth which surrounds the base of the pedicel of the obovate, smooth ovary; the style very short, lateral; stigma slightly dilated. Fertile female flowers with perianth like the galls; the achene broad, rhomboid, rough.

In moist jungles at the base of the Eastern Himalaya,—*Griffith*, Kew Distrib. No. 4639; *King*, No. 8732. Chittagong,—*Lister.*

A very remarkable species, very distinct from every other *Covellia* by its enormous, much-branched clusters of long-peduncled receptacles, which are either wholly or partially buried in the soil. The leaves resemble those of *hispida*, Linn. fil., but are thinner in texture and more setose. Like those of *hispida*, the leaves dry of a dull green colour.

PLATE 123.—*F. conglobata*, King. Leaf and fig-bearing branch. 1, receptacle; 2, apex of the same; 3, stipules—*all of natural size;* 4, male flower with its 3 perianth leaves; 5, gall flower; 6, achene of fertile flower: *enlarged.*

114. Ficus Vriesiana, *Miq. in Ann. Mus. Lugd. Bat.* iii. 234, 296.

A tree; the young shoots covered with dense harsh brown tomentum. Leaves membranous, petiolate, elliptic, sometimes sub-obovate-elliptic; the apex shortly acuminate; the edges serrate-dentate from base to apex; the base rounded, slightly unequal, obscurely 3-nerved; primary lateral nerves about 10 pairs, prominent beneath and, like the midrib, covered with long, spreading, stiff brown hairs; the rest of the lower surface sparsely pilose, minutely tuberculate; upper surface sparsely adpressed-strigose, the midrib and primary nerves setose; length of blade 6 to 8 in.; petiole stout, densely tomentose, about ·5 in. long; stipules linear-lanceolate, pilose, about 1 in. long. Receptacles borne in fascicles of from 6 to 8 on panicled, deciduously-tomentose, leafless, stipulate branches rising from the trunk near the ground; long pedunculate, solitary, pyriform, deeply grooved, pilose when young, smooth and glabrous when mature, about ·5 in. across; basal bracts 3, ovate, blunt. Fertile female flowers without perianth; carpel ovate; style elongate, lateral. Male and gall flowers not seen.

Java,—*De Vriese.*

A specimen in Beccari's Herbarium (bearing no number), collected in the island of Kei, may possibly belong to this species.

This species is closely allied to *F. stolonifera* and *F. Treubii*, but has more tomentose shoots and long-pedunculate receptacles which are borne on much thicker branches.

Plate 124.—*F. Vriesiana*, Miq. 1, apex of leafy branch; 2, apex of receptacle-bearing branch—*of natural size;* 3 & 4, female flowers: *enlarged.*

115. Ficus hypogœa, *nov. spec.*

A small tree; the young shoots hispid-pilose, but soon becoming almost glabrous. Leaves petiolate, membranous, broadly ovate-elliptic or sub-obovate-elliptic, slightly inequilateral; the apex shortly acuminate; the edges minutely serrate; the base cordate or narrowed and emarginate, 5-nerved; primary lateral nerves about 9 pairs, prominent on both surfaces; under surface hispid-pilose, especially on the midrib and nerves; upper surface like the under, but with fewer hairs; length of blade 10 to 12 in.; petiole 1 in. to 2·25 in., pilose-hispid; stipules 2 to each leaf, lanceolate, more or less glabrous, except the midrib which is pilose externally. Receptacles (borne on long, subterranean, much-divided, puberulous, root-emitting, leafless branches, which bear near their extremities a few pairs of ovate-obtuse, scarious stipules), solitary or in small fascicles, shortly pedunculate, pyriform or sub-globose; their surfaces glabrous, vertically ridged, and bearing numerous small, irregular swellings; about ·75 in. across when ripe; the apical umbilicus depressed and surrounded by an irregular double annulus of thickened scales; basal bracts several, irregular, adpressed. Fertile female flower pedicellate, sub-globose, smooth; style lateral, thin, much longer than the ovary, glabrous; stigma clavate; perianth none. Male and gall flowers unknown.

Eastern Sumatra, at elevations of from 3,500 to 5,000 ft.,—*H. O. Forbes*, Herb. Forb. No. 2505; Borneo,—*Beccari*, Herb. Becc. P. B. No. 2798, *Teysmann*, *Motley* No. 465.

A very remarkable species, concerning the receptacles of which Mr. H. O. Forbes notes that the "fig-bearing branches issue from the stem very near the ground, and at once become sub-terrestrial, producing figs either entirely or partially buried. These figs, when very young, are devoid of colour on the upper half, but are pinkish in the lower half. When a little older they become reddish-pink all over; and when mature they are of a greenish-grey colour." The irregular swellings which occur here and there on their sides are really the bases of thickened bracts which have become confluent with the receptacle.

PLATE 125.—*F. hypogæa*, King. 1, apex of leafy branch; 2, 3, 4, pieces of a fig-bearing subterranean branch; 5, mature receptacle; 6, another receptacle—seen from the side; 7, stipules—*all of natural size;* 8, fertile female flowers: *enlarged.*

116. FICUS CUNIA, *Ham. MSS.; Roxb. Fl. Ind.* iii. 561; *Wight's Icon* 648; *Miq. in Ann. Mus. Lugd. Bat.* iii. 282, 296; *Brandis For. Flora* 421; *Bedd. Flor. Sylvat.* 224; *Kurz For. Flora Brit. Burm.* ii. 461.—*F. conglomerata*, Roxb. Fl. Ind. iii. 559; Wight's Icon 669; Wall. Cat. 4531 A to H. *Covellia cunia*, *conglomerata*, and *inæquilobia*, Miq. in Lond Journ. Bot. vii. 459.

A small tree; young branches sub-scabrid, pubescent. Leaves alternate, thinly coriaceous, petiolate, inequilateral, oblong-lanceolate to elliptic, with acuminate apex, remotely serrate or sub-entire edges and very unequal semi-sagittate base; the larger basal lobe 3- to 4-nerved, the smaller 1- to 2-nerved; primary lateral nerves 9 to 14 pairs, prominent, as are the straight secondary nerves and the minute reticulations; the whole of the under surface when young minutely tomentose or harshly pubescent, glabrescent when adult, but harsh and rigid from the nerves and reticulations; upper surface from scabrid to smooth; petioles ·2 to ·6 in. long, scabrid; stipules linear-lanceolate, puberulous externally, glabrous internally, ·75 in. to 1 in. long. Receptacles shortly pedunculate, turbinate, globular or pyriform, with prominent large-scaled umbilicus and tribracteate base, shortly hispid, verrucose, and often with irregular bracts on their sides; reddish-brown when ripe, and from ·4 to ·7 in. across, in pairs or small fascicles from long, leafless, scaly (occasionally leafy) branches, which issue in great numbers from the larger branches and lower part of the stem. Male flowers near the ostiole only, the perianth of 3 pieces; stamen with short filament and ovate anther. Gall flowers mostly pedicellate; the perianth of about 4 lanceolate pieces united below; the ovary globular, smooth; style lateral, very short. Fertile female flowers pedicellate; the perianth like that of the galls, but the pieces narrower; ovary broadly ovoid, emarginate at one side, minutely tuberculate, viscid; style long, lateral, with large bifid stigma.

Sub-Himalayan forests, from the Chenab to Bhootan; hilly ranges of Central India, Assam, Khasia, Chittagong, and Burmah up to elevations of 4,000 ft. Not very variable considering its wide distribution.

The form named *F. conglomerata* by Roxburgh has broader, smoother leaves, and more globular receptacles than typical *cunia*, Ham., but it is unmistakably the same species. The leaves of young shoots are often coarsely serrate.

VAR. CONGLOMERATA. Leaves broader and smoother and receptacles more globular, than in type.—*F. conglomerata*, Roxb.

PLATE 126.—*F. cunia*, Ham. 1, leafy branch; 2, fruiting-branch from the base of the stem bearing mature receptacles; 3, apex of a receptacle; 4, base of the same; 5, stipules: *all of natural size.*

Plate 127.—*F. cunia*, Ham., var. *conglomerata*. Apex of a leafy branch and part of a fruiting-branch bearing mature receptacles—*both of natural size.* 1, male flower; 2, gall flower; 3, fertile female flower: *enlarged.*

117. Ficus geocarpa, *Teysm. Mss.; Miq. in Ann. Mus. Lugd. Bat.* iii. 231, 296.

A small tree; the young shoots densely hispid-pilose or setose. Leaves membranous, shortly petiolate, inequilateral, oblong; the apex acuminate; edges entire; base very unequal, semi-sagittate; the larger basal lobe with 4 or 5 nerves, the smaller 1-nerved; primary lateral nerves 4 to 7 pairs, prominent (as also is the midrib) on both surfaces; lower surface minutely papillose, pilose-hispid, especially on the midrib and nerves; upper surface like the under, but the hairs sparser and more adpressed; length of blade 9 to 15 in.; petiole ·5 to ·75 in., setose; stipules oblong-lanceolate, adpressed-pilose externally, their midribs setose, the inner surface glabrous, from 1·5 to 2 in. long. Receptacles borne on thin, setose or hispid root-emitting branches which issue from the base of the trunk; solitary from the axils of opposite abortive leaves or stipules; shortly pedunculate or sessile, pyriform or depressed-globose, the surface bearing many membranous or fleshy bracts, which are confluent at their bases and free only at their thickened, slightly in-curved, sub-glabrous apices; the whole surface, including the lower and confluent part of the bracts, densely covered with brown tomentum; about 1 in. to 1·4 in. across; the apical umbilicus depressed, surrounded by an irregular double ring of in-curved, thickened bracts; basal bracts 4 or 5, small, ovate, glabrous, adpressed; peduncle, when present, ·1 to ·2 in., glabrous. Fertile female flowers pedicellate, without perianth; the style twice as long as the ovary, lateral; stigma clavate; ripe achene rhomboid, minutely tuberculate.

Celebes,—*Teysmann;* Sarawak in Borneo,—*Beccari.,* Herb. Becc. P. B. Nos. 2797 and 2901.

Var. uncinata.

Receptacles pyriform, sub-globose; the bracts on their surface longer and more fleshy than in the type, uncinate; peduncles about 5· in. long, bearing many uncinate bracts.

Borneo,—*Beccari*, Herb. Becc. P. B. 2458.

The receptacle-bearing branches of this and allied species often bury themselves in the soil, and the figs are quite subterranean.

Plate 128.—*F. geocarpa*, Teysm. 1, apex of leafy branch; 2, pieces of a fruiting-branch bearing receptacles in various stages of immaturity; 3, mature receptacle seen from the side; 4, apex of the same; 5, stipules—*all of natural size;* 6, fertile female flower, *young;* 7, ripe achene of fertile female: *enlarged.*

Plate 129.—*F. geocarpa*, Teysm., var. *uncinata.* 1, apex of leafy branch; 2, part of a fruiting-branch with receptacles in various stages of ripeness: *of natural size.*

118. Ficus Beccarii, *nov. spec.*

A small tree (?); the young branches completely covered with very closely adpressed, stiff, tawny hairs. The leaves shortly petiolate, membranous, oblong-lanceolate; the apex produced into a long, narrow acumen; the edges entire, slightly recurved; the base cuneate, 3-nerved; primary lateral nerves about 12 pairs, prominent beneath and, like the midrib and petiole, adpressed pilose-hispid, the rest of the lower surface (but especially the intermediate nerves and open, distinct, reticulations) sparsely covered with short, rather stiff hairs; the upper surface glabrous; length of blade 12 to 15 in., breadth not more than 3 in.; petiole ·4 to ·6 in.; stipules of leaves linear-lanceolate, 1·5 in. long. Receptacles borne on much-divided, scurfy, villose, leafless, stipule-bearing branches, which rise from the stem near the ground, solitary, nearly sessile, depressed-globose, the sides bearing many fleshy, broad, flat, slightly uncinate bracts, the bodies of which are fused with the receptacle, leaving only the apices free; the whole surface, except the glabrous apices of the bracts, covered with deciduous scurf which ultimately completely disappears; apical umbilicus depressed, surrounded by a ring of sausage-shaped, fleshy, uncinate bracts; basal bracts 3, ovate-acuminate, adpressed; pedicel ·1 to ·2 in. long, broad, flat. Male and gall flowers not seen. Fertile female flowers without perianth, pedicellate; carpel smooth, rhomboid; style smooth, thin, lateral, short; stigma cylindric.

Sarawak in Borneo,—*Beccari*, Herb. Becc. P. B. 2900.

A very distinct and handsome species, worthy to bear the name of its illustrious discoverer. Like *F. hypogœa*, this has either entirely or partially subterranean receptacles. It is closely allied to that species, but is readily distinguished from it by its leaves and stipules.

PLATE 130.—1, apex of leafy branch of *F. Beccari*, King; 2, part of a fig-bearing branch; 3, a receptacle—seen from the side; 4, apex of the same; 5, stipules from the fig-bearing branch; 6, stipules from the leafy branch—*all of natural size;* 7 & 8, carpels: *enlarged.*

119. FICUS CONORA, *nov. spec.*

A tree; all the young parts softly pubescent; the young branches pale-coloured. Leaves petiolate, membranous, elongate-lanceolate, slightly inequilateral; the apex acuminate; the edges entire; the base narrowed, 3-nerved; primary lateral nerves 5 to 8 pairs, slightly prominent beneath and, like the midrib, tomentose; the rest of the under surface pale in colour and (in the adult state) very shortly hispid and minutely papillose (the papillæ white); upper surface covered with very minute white dots, but no hairs; length of blade 4 to 7 in.; petiole ·35 in. long, tomentose; stipules lanceolate, pubescent externally, ·6 in. long. Receptacles borne on long, thin, flexuose, leafless, nearly glabrous branches which issue from the base of the stem, solitary, long-pedunculate, turbinate; the apex very broad and depressed; the sides faintly ridged, scurfy-pubescent, and with numerous flat, smooth warts; 1 in. across when ripe; umbilical scales large and thick; basal bracts none; peduncle thick, pubescent, bearing 3 small, broadly triangular bracts at or below the middle, varying in length from ·5 in. to 1·25 in. Fertile female flowers pedicellate or sessile; the ovary sub-globular, smooth; style elongate, subterminal; receptacular scales long, pale, not numerous. Male and gall flowers unknown.

New Guinea,—*Ramoi; Beccari*, Herb. Becc. P. P. No 388.—Ternate ad Acqui conora, *Beccari*.

The receptacles are often either partially or entirely covered by the soil.

PLATE 131.—*F. conora*, King. 1, leafy branch; 2, fig-bearing branch with mature receptacles—*of natural size;* 3, piece of a leaf to show the minute tubercles on the

upper surface; 4, stipule; 5, bract from peduncle (*Nos.* 3 *to* 5 *are magnified about three times*); 6, fertile female flower: *enlarged.*

120. FICUS STOLONIFERA, *nov. spec.*

A tree; the young shoots shortly hispid-pubescent. Leaves membranous, petiolate, slightly inequilateral, elliptic or oblong-elliptic; the apex shortly acuminate; the edges dentate; the base rounded or slightly narrowed, not cordate, obscurely 3- to 5-nerved; lateral primary nerves about 7 pairs, prominent and, like the midrib, hispid-tomentose on both surfaces; under surface minutely hispid, upper surface minutely hispid and with numerous small, black, harsh papillæ; length of blade 6 to 9 in.; petiole ·4 in. long, hispid; stipules ovate-acuminate, oblique, densely pubescent-hispid externally, ·35 in. long. Receptacles borne on long, thin, flexuose, slightly adpressed-pubescent and rather scurfy, leafless, stipulate branches; solitary, sessile, or on very short peduncles, globose, glabrous, with a few fleshy projecting scales near the apex, which form an irregular annulus round the depressed umbilicus; basal bracts none; diameter ·6 in. Fertile female flowers without obvious perianth; ovary pedicellate, ovoid, smooth; style lateral, long, hairy; stigma clavate. Male and gall flowers unknown.

Sarawak in Borneo,—*Beccari*, Herb. Becc. P. B. *No.* 2799.

In this, as in the allied species, the receptacles are often buried in the ground. This resembles *F. hypogœa* in having dentate leaves, but differs in its receptacles.

PLATE 132.—*F. stolonifera*, King. 1, apex of leafy branch; 2, part of a fig-bearing branch with mature receptacles—*of natural size;* 3, part of a leaf to show the stiff hairs; 4, stipule (*Nos.* 3 *and* 4 *are magnified about three times*); 5, fertile female flower: *much enlarged.*

121. FICUS ARFAKENSIS, *nov. spec.*

A tree; the young shoots scurfy and softly pubescent. Leaves petiolate, sub coriaceous, lanceolate, acute, gradually narrowed to the faintly-3-nerved base; edges entire; primary lateral nerves 6 to 8 pairs, obsolete on the upper, prominent on the lower surface and, like the midrib and secondary nerves, adpressed-pilose; the rest of the lower surface minutely white, tuberculate, sparsely pilose; upper surface sparsely covered with adpressed whitish hairs; length of blade 4·5 to 7 in.; petiole pilose, ·6 in. long; stipules linear-lanceolate, glabrous, nearly 1 in. long. Receptacles borne on long, ramous, slender branches which emerge from the base of the stem and apparently creep on or beneath the surface of the ground, pedunculate, ovoid, scabrid, slightly verrucose, ·45 in. across; umbilical scales numerous, prominent; basal bracts 3, triangular.

Mount Arfak, in New Guinea, at from 5,000 to 7,000 ft. above the sea,—*Sig. Beccari* (Herb. Becc. without number).

The receptacle-bearing branches often carry towards their extremities small leaves and modified stipules.

PLATE 133.—*F. Arfakensis*, King. 1, leaf branch; 2, receptacle-bearing branch; 3, bract from the same; 4, stipule—*all of natural size;* 5, part of a leaf: *enlarged.*

122. FICUS TREUBII, *nov. spec.*

A tree; the young shoots villose. Leaves membranous, elliptic, slightly inequilateral; the apex produced into a long linear acumen; the edges entire, sub-revolute when dry, slightly narrowed to the blunt 3-nerved base; lateral primary nerves 6 pairs, prominent on the lower surface and, like the midrib and secondary nerves, hispid-pubescent; the rest of the lower surface minutely hispid; upper surface not papillose, glabrous; length of blade 6 to 8 in., petiole ·5 in., tomentose; stipules lanceolate, villous externally, ·5 in. long. Receptacles borne on long, thin, flexuose, tomentose or pubescent, leafless, stipule-bearing branches, which issue from the stem near the ground; sessile, solitary, or in small clusters; obovate, conspicuously umbonate, glabrous, about ·6 in across; basal bracts 3, broadly ovate, adpressed-pubescent; fertile female flowers pedicellate, without obvious perianth; ovary pedicellate, smooth, sub-globose; style lateral, hairy; stigma cylindric. Male and gall flowers unknown.

Sarawak, in Borneo,—*Beccari*, Herb. Becc. P. B. No. 2800.

A species approaching *F. hypogœa* in the shape of the leaves, but differing as to the receptacles and the branches on which they are borne. This species produces its figs either on the surface of the ground or slightly covered by soil.

PLATE 134.—*F. Treubii*, King. 1, leafy branch; 2, part of a fig-bearing branch with one mature and many very immature figs—*of natural size;* 3, a stipule; 4, basal bract of receptacle; 5, receptacle; 6, fertile female flower: *enlarged.*

123. FICUS PROSTRATA, *Wall. Cat.* 4536; *Miq. in Ann. Mus. Lugd. Bat.* iii. 297.—*Covellia prostrata*, Miq. in Lond. Journ. Bot. vii. 465.

A small glabrous tree. Leaves petiolate, membranous, alternate, oblanceolate-oblong; the apex long, acuminate; tapering from above the middle to the rather blunt 3- to 5-nerved base; primary lateral nerves about 10 pairs, distinct on the lower surface, as are also the secondary nerves and minute reticulations; both surfaces shining, glabrous; length of blade 5·5 in. to 7 in.; petioles about ·5 in.; stipules linear-lanceolate, convolute, about ·8 in. long. Receptacles borne on very long, flexuose, little-divided, glabrous, leafless branches; pedunculate, solitary from the axils of scarious bracts (shortened stipules), sub-pyriform, verrucose, and with a few scales on the sides, glabrous; basal bracts 3, ovate, acuminate, rather irregular; peduncle ·3 in. long. Male and gall flowers not seen. Fertile female flowers sessile or pedicellate; the perianth of 3 or 4 linear pieces, which in the adult are detached from the broadly-ovoid, sub-rhomboid, minutely-tuberculate achene; style about as long as the achene; stigma cylindric.

Khasia and Silhet,—*Wallich;* Sikkim, at elevations of about 2,000 ft.,—*King.*

The fig-bearing branches of this tree trail on the surface of the ground; they are often 10 to 12 ft. in length. This species is closely allied to *F. ribes*, Reinw., from which it differs chiefly by its larger size, total want of hairs and larger receptacles. The two are, however, connected by intermediate forms. Part of the specimens issued by Wallich as *prostrata* are undoubtedly *ribes*, Reinw. This is not a common species. I have never been able to find male flowers of it.

PLATE 135.—*F. prostrata*, Wall. 1, apex of leafy branch, 2, part of a fig-bearing branch with mature receptacles; 3, apex of receptacle; 4, base of same; 5, stipules—*all of natural size;* 6, fertile female flower, *young;* 7, ripe achene: *both enlarged.*

124. FICUS BRACHIATA, *nov. spec.*

A tree; the young shoots adpressed-pilose. Leaves thinly coriaceous, inequilateral, elliptic-lanceolate; the apex acute or shortly acuminate; the edges entire, sometimes irregularly and minutely undulate; base acute, obscurely 3-nerved; lateral primary nerves 8 to 10 pairs, sub-horizontal, rather prominent beneath and adpressed-pubescent, as are the midrib and secondary nerves; the rest of the lower surface puberulous or glabrous; the reticulations minute, indistinct; upper surface glabrous; length of blade 4 to 5 in; petiole ·5 in. long; stipules 1 in. long, glabrous. Receptacles borne on long, leafless, glabrous, very ramous branches which issue from the stem near the ground, pedunculate, turbinate, verrucose, puberulous, about ·5 in. across; the umbilical scales numerous and prominent; basal bracts 3, broadly ovate; peduncle ·35 in. long. Male and gall flowers not seen. Fertile females mostly sessile, without perianth; style elongate, terminal, and straight in young—lateral and curved in old—ovaries.

Mount Dempe, Eastern Sumatra, at elevations of about 4,500 ft.,—*Mr. H. O. Forbes*, No. 2313.

This approaches *F. Miquelii*, but has smaller, narrower leaves; the receptacles are smaller, and are borne on much longer branches.

PLATE 136.—*F. brachiata*, King. 1, apex of leafy branch; 2, part of a branch bearing receptacles; 3, apex of a receptacle; 4, base of the same; 5, basal bracts; 6, stipules —*all of natural size;* 7, young carpel; 8, old carpel: *enlarged.*

125. FICUS MIQUELII, *King in Journ. As. Soc. Bengal.*—*F. caulocarpa*, Miq. in Ann. Mus. Lugd. Bat. iii. 235, 297 (not *Urostigma caulocarpa*, Miq. in Lond. Journ. Bot. vi. 568).—*F. fistulosa*, Kurz (not of Reinw.) For. Flora Brit. Burmah ii. 459, partly.

A tree; the young branches adpressed-strigose. Leaves alternate or sub-opposite, membranous, obovate-oblong or oblanceolate; the apex suddenly contracted into a narrow tail about 1 in. long; edges entire; base much narrowed, 3-nerved; lateral primary nerves 6 to 8 pairs, forming an obtuse angle with the midrib; both surfaces pubescent when young, becoming, when adult, almost glabrous; length of blade 4·5 to 8 in.; petioles from ·3 to ·5 in.; stipules lanceolate, pubescent externally, ·35 in. long. Receptacles borne on rather large, panicled, scurfy, shortly-bracteolate branches issuing from the stem; pedunculate, depressed-globular, pubescent; greenish when ripe and with pale stripes, about ·75 in. across; umbilical scales numerous, rather broad; basal bracts 3, ovate-acute; peduncles ·6 in. long. Male flowers only near the ostiole, sessile; the perianth inflated, of three broadly ovate, much-imbricate pieces; anther broadly ovate, its apex emarginate, sub-sessile. Gall flowers sub-sessile or long-pedicellate, without perianth; the ovary ovoid-globose, smooth; style short, lateral; stigma tubular. Fertile female flowers without perianth, pedicellate; the achene obovoid, minutely tuberculate; style as long as ovary, lateral; stigma cylindric.

Celebes,—*De Vriese;* Singapore,—*King;* Sumatra,—*Beccari*, Becc. Herb. P. S. Nos. 544, 631, 761; Perak, *King's Collector*, Nos. 955, 1883; Burmah,—*Kurz*, Nos. 1520, 3145; New Guinea,—*Forbes*, No. 903.

This species is allied to *F. botryocarpa*, Miq., by the short, much-branched, receptacular panicles.

This is the plant which Miquel described as *Covellia caulocarpa*, but as he had already described a *Urostigma caulocarpa*, it became necessary to find a new name for it, and I have taken the opportunity of re-naming it after this distinguished botanist.

PLATE 137.—*F. Miquelii*, King. 1, apex of leafy branch; 2, part of a receptacular branch with immature receptacles; 3, part of the same with mature receptacles; 4, apex of a receptacle; 5, base of the same showing the basal bracts; 6, stipules—*all of natural size;* 7, male flower; 8, gall flower; 9, fertile female flower: *enlarged.*

126. FICUS BOTRYOCARPA, *Miq. in Ann. Mus. Lugd. Bat.* iii, 233, 296.

A tree; the young shoots deciduously pubescent. Leaves scattered, distant (sometimes opposite, *fide* Miquel), short-petioled, membranous, elongate, lanceolate or oblanceolate; apex acute; edges entire; base obscurely 3-nerved; lateral primary nerves 5 or 6 pairs, not prominent; both surfaces dull, thickly covered, but especially the upper, with minute white papillæ, almost glabrous, except the midrib and larger nerves which are sparsely adpressed-pilose beneath; length of blade 3·5 to 5 in.; petiole ·25 in., adpressed-pilose; stipules ovate-lanceolate, pilose externally, ·75 in. long. Receptacles on long, paniculate, almost smooth, little-branching, leafless, bracteate branches issuing from the stem and larger branches, solitary or in pairs, pedunculate, depressed-globose when ripe; the umbilicus concave; the base constricted, with a short stalk at the junction of which with the peduncle proper are 3 small bracts; the sides smooth, about ·65 in. across. Male and gall flowers not seen. Fertile female without perianth; carpel ovate-rhomboid; style curved, lateral.

Celebes,—*Teysmann.*

This species is represented in the Dutch collections by only a few specimens. It is well distinct from anything else.

PLATE 138.—*F. botryocarpa*, Miq. 1, leafy branch; 2, branch bearing receptacles; 3, base of receptacle; 4, apex of the same; 5, stipules—*all of natural size;* 6, carpel: *enlarged.*

127. FICUS MYRIOCARPA, *Miq. in Ann. Mus. Lugd. Bat* iii. 230, 296.

Probably a tree; the bark of the young branches dark-coloured and with many stout, adpressed bristles. Leaves membranous, petiolate, rotund-ovate with acute apex, minutely serrate edges, and cordate, 5- to 7-nerved base; lateral primary nerves 7 to 9 pairs, prominent; intermediate nerves rather transverse and little curved; reticulations minute, all distinct on the lower surface which is hispid-pubescent; upper surface scabrid-hispid, pubescent on the midrib and main nerves; length 7 to 10 in., breadth 5·5 to 8 in.; petioles covered with stout, spreading bristles, varying in length from 1 in. to 2·5 in.; stipules persistent, large, flaccid, linear-lanceolate, sparsely setulose externally, glabrous internally, 2·5 in. long. Receptacles shortly pedunculate, in pairs or small fascicles from long, thin, scurfy, pubescent, leafless branches which issue from the trunk, sub-globose, slightly constricted towards the minutely-tribracteate base, shortly fulvous tomentose-pubescent, ·2 in. across when ripe; peduncles about ·25 in. long. Fertile female flowers surrounded by many hairs which arise from the receptacle, sessile, without perianth; carpel rotund; style long, sub-terminal in the young state. Gall and male flowers not seen.

Amboina,—*Teysmann.*

A very remarkable and distinct species, collected only by Teysmann. It has the habit of *F. cunia*, but has much larger leaves and smaller receptacles.

PLATE 139—Part of a leafy branch of *F. myriocarpa*, Miq. 1, fruiting-branch of the same with mature receptacles; 2, terminal bud showing the large stipules; 3, base of receptacle; 4, apex of the same—*all of natural size;* 5, female flower: *enlarged.*

128. FICUS MINAHASSÆ, *Miq. in Ann. Mus. Lugd. Bat.* iii. 231, 296.—*Bosscheria Minahassæ*, Teysm. et De Vriese in Nat. Tijdschr. Ned. Ind. xxiii. 212-14.—*Prismatosyce Minahassæ*, Herb. Teysm.

A tree, with its young shoots densely setose and its receptacles in capituliform clusters. Leaves membranous, petiolate, broadly ovate-elliptic, with acute or minutely acuminate apex; the edges with very minute callous serrations; the base deeply cordate, with 7 to 9 radiating nerves; lateral primary nerves 6 to 9 pairs; secondary nerves nearly transverse, little curved; reticulations rather lax,—all rather distinct on the lower surface, which is covered with long, stiff, spreading, tawny hairs; the upper surface scabrid-hispid; the midrib and nerves pilose-hispid; length of blade 7 to 12 in.; petioles 1·5 in. to 2·5 in., setose; stipules large, persistent, oblong-lanceolate, sparsely setulose externally, glabrous internally, 2 in. long. Receptacles small, sessile, prismatic, obpyramidal; the apex flat, verrucose, and with a prominent umbilicus; the base with 3 large, glabrous, adpressed bracts; individual receptacles about ·1 in. to ·15 in. across, collected into dense, rounded, sessile or bracteolate, pedunculate capitula, each about 1 in. in diameter, which are attached along long, thin, leafless, scaly branches which proceed from the stem and main branches. Male flowers few, near the apex of the receptacles containing gall flowers. Females sessile, rounded; the perianth of 3 or 4 rounded, very concave pieces; anther 1, nearly sessile, lying in the hollow of one of the pieces of the perianth. Gall flowers sub-sessile; the perianth of 3 rounded, stalked, concave pieces; the ovary ovoid, smooth; the style short, thick, lateral; stigma slightly dilated. Fertile female flowers in separate receptacles from the former; the achene obliquely ovoid, slightly tuberculate; the style longer than the achene, thickened below, thin above; stigma infundibuliform; the interior of the receptacle lined with stiff hairs.

Celebes,—*Teysmann.*

This is another of the numerous magnificent things collected during one of his journeys in the Malayan Archipelago by the late indefatigable M. Teysmann. It has apparently been collected by no one else. It is distinguished from all other known species of *Ficus* by the extraordinary arrangement of its receptacles, of which the accompanying drawings give but a poor idea.

The male flowers are few, and not easy to find. Miquel says he found only remains of them; and his description of the female flower shows that he had seen only the insect-attacked form which occupies the receptacle with the males. I have, however, succeeded in finding perfect males.

PLATE 140.—*F. Minahassæ*, Miq. 1, apex of a leafy branch; 2, piece of a fruiting-branch showing the arrangement of the receptacles in capitules; 3, stipules: *of natural size.*

PLATE 141.—*F. Minahassæ*, Miq. 5, apex of a fruiting-branch bearing capitules of immature receptacles; 6, a single receptacle; 7, bracts from fruiting-branch—*of natural*

size ; 8, side view of a single receptacle; 9 & 10, apex and base of the same—*slightly enlarged ;* 11, unexpanded male flower; 12, single stamen of male flower embedded in one of the pieces of the perianth; 13, gall flower; 14, fertile female flower; 15, achene of fertile female: *all enlarged.*

129. Ficus stipata, *nov. spec.*

A tree; the young branches softly pubescent. Leaves shortly petiolate, membranous, slightly inequilateral, oval-elliptic or occasionally obovate-elliptic, narrowed to each end; the apex with a long narrow tail nearly 1·5 in. long; base sub-cordate, 5 nerved; edges waved, sub-entire; primary lateral nerves about 8 pairs, stout and, like the midrib, prominent on the lower surface which is softly pubescent, the reticulations being very distinct; upper surface glabrous, shining; length of blade 10 to 12 in.; petioles stout, softly pubescent, ·3 in. long; stipules 2 at the base of each petiole, linear-lanceolate, erect, pubescent, ·8 in long. Receptacles in dense clusters from very short tubercles from the branches issuing from the stem near the root, apparently hypogœal or sub-hypogœal, on long peduncles, globular, slightly umbonate, glabrous; basal bracts none; peduncles slender, scabrid, ·75 in. to 1·25 in. long. Male and gall flowers not seen. Fertile female flowers with no apparent perianth, some of them enclosed in scales of the receptacle; carpel obovoid; style long; stigma clavate.

Province of Padang, in Sumatra, at an elevation of about 1,300 ft.,—*Sig. Beccari*, Herb. Becc. P. S. No. 648.

In foliage this resembles *F. geocarpa*, but the small, crowded receptacles are totally different from those of that species.

Plate 142.—*F. stipata*, King. 1, apex of leafy branch; 2, part of root-branch with fascicles of nearly mature receptacles—*of natural size ;* 3, mature receptacle—*slightly enlarged ;* 4, carpel: *much enlarged.*

130. Ficus Forbesii, *nov. spec.*

A tree; the young branches, petioles and midribs of the leaves covered with dense, short, tawny tomentum. Leaves thickly membranous, shortly petiolate, elliptic or obovate-elliptic; the apex suddenly and shortly cuspidate; gradually narrowed from above the middle to the blunt 3-nerved base; the edges entire; primary lateral nerves 12 to 20 pairs, prominent on the lower surface, as are the midrib and straight transverse secondary nerves; the whole of the rest of the lower surface sparsely covered with stellate tawny hairs; length of blade 12 to 15 in.; petiole stout, ·25 in. long. Receptacles in lax umbels from long, leafless, glabrous, little-divided branches which issue from the stem near its base; pedunculate, globose, glabrous, ·25 in. across, slightly umbonate at the apex; the base constricted into a short stalk at the junction of which with the peduncle proper are 3 ovate-acute bracts. Male and gall flowers not seen. Female flower without obvious perianth; ovary obovate, about half as long as the style.

Sumatra,—*Mr. H. O. Forbes* (Herb. Forb., without number).

The receptacular branches ramify very little; at their apices there are whorls of stipule-like lanceolate bracteoles. The stellate pubescence is very peculiar. This species comes very near *F. ribes*, Reinw., from which it differs chiefly in its leaves. The female flowers of this are exactly like those of *F. ribes.* I have been able to find no male flowers, and I think it probable that, like *F. ribes*, this species is practically diœcceous, receptacles containing male and gall flowers occurring on different trees from those containing female flowers. The species is known only from Mr. Forbes's specimens, which were all probably collected from one tree.

PLATE 143.—*F. Forbesii*, King. 1, leafy twig; 2, end of a receptacle-bearing branch from the base of the stem—*of natural size;* 3, female flower: *enlarged.*

131. FICUS RIBES, *Reinw. in Bl. Bijd.* 463; *Miq. in Ann. Mus. Lugd. Bat.* iii. 284, 297; *Kurz For. Flora Brit. Burm.* ii. 458.—*F. polycarpa*, Wall. Cat. 4509 A, B, C (not of Roxb.)—*F. prostrata*, Wall. Cat. 4536 (in part).—*Covellia ribes*, Miq. Fl. Ind. Bat. i. pt. 2. 325.—*Cov. microcarpa*, Miq. Lond. Journ. Bot. vii. 466. tab. 9A.—*Cov. paniculata*, Miq. l.c. 467; Pl. Jungh. 67.

A small tree; the young branches sparsely strigose, slightly swollen at the insertion of the leaves. Leaves alternate, petiolate, membranous, lanceolate or oblanceolate, inequilateral, slightly falcate; the apex long-acuminate; gradually narrowed from above the middle to the narrow sub-3-nerved base; the edges entire; lateral primary nerves 7 to 9 pairs, not prominent; both sides glabrous except the lower which, on the midrib and larger nerves, is adpressed-pubescent; length of blade 2·5 to 4·5 in.; petioles strigose, ·3 in. long; stipules linear-lanceolate, convolute, ·8 in. long. Receptacles rising from elongated, ramous, leafless (sometimes stipulate towards the apex) glabrous branches which issue from the stem near the ground, pedunculate, sub-globose, strongly ribbed; when young verrucose, puberulous; about ·2 in. across when ripe; umbilicus closed by 5 broad scales; the base constricted into a stalk about ·1 in. long at the junction of which with the peduncle are 3 small bracts; peduncle proper ·2 in. long. Male flowers numerous, the perianth of 2 large, inflated, roundish pieces; anther single, almost sessile, very broad. Gall flowers mostly sessile, without perianth; the ovary broad, obliquely obovoid, sub-rhomboid, with terminal thick style. Fertile female flowers in separate receptacles, mostly pedicellate; the perianth tubular, short, covering only the pedicel of the rhomboid, minutely-tuberculate achene; style much longer than the achene; stigma cylindric or clavate.

Java, Sumatra, Singapore, Philippines,—*Cuming*, 1939; New Guinea,—*Forbes.*

A species allied to *Miquelii* and *botryocarpa*, but well distinct by its smaller receptacles.

PLATE 144.—*F. ribes*, Reinw. 1, apex of a leafy branch; 2, receptacle-bearing branch from the stem; 3, apex of a receptacle; 4, stipules—*all of natural size;* 5, stamen from male flower; 6, ovary and style of gall flower; 7, perianth, achene, style, and stigma of fertile female flower: *all enlarged.*

132. FICUS CUNEATA, *Miq.* (*not of Wall.*) *in Ann. Mus. Lugd. Bat.* iii. 297.—*Covellia cuneata*, Miq. in Lond. Journ. Bot. vii. 466. t. 8B; Fl. Ind. Bat. i. pt. 2. 326.

A tree; the young shoots densely adpressed-pubescent. Leaves petiolate, membranous, (opposite on the young branches); obovate-oblong or sub-rhomboid; the apex acuminate; edges sub-crenulate, undulate; base much narrowed, obscurely 3-nerved; primary lateral nerves about 6 pairs, prominent beneath and, like the midrib, covered with adpressed white hairs; both surfaces thickly covered with minute white tubercles, sub-scabrid; length of blade 3 inches; petiole adpressed-pubescent, ·4 in. long; stipules lanceolate, pilose, ·6 in. long. Receptacles on long, ramous, pubescent, leafless branches from the stem, sessile, sub-globose, densely pilose, slightly contracted at the base into a short stalk; basal bracts 3, minute, pilose. Fertile female flowers without perianth, sessile or pedicellate, surrounded at their bases by the numerous hairs of the interior of the receptacle; carpel elongate obovate; the style short. Male flowers, according to Miquel, monandrous; the perianth of 4 leaflets.

Philippines,—*Cuming*, No. 1938.

A species not far removed from *F. ribes*, Reinw., but distinguished from that species by its sub-rhomboid, fewer-nerved, densely-tuberculate leaves. This has nothing to do with the plant issued as *F. cuneata* by Wallich (Cat. No. 4534), which is, as I am informed by Mr. W. Botting Hemsley, not a *Ficus* at all, but *Erythroxylon Burmanicum*, Griff.

Plate 145A.—*F. cuneata*, Miq. 1, leafy branch; 2, leafless branch with mature receptacles; 3, stipules—*all of natural size;* 4 & 5, sessile and pedicellate fertile female flowers; 6 & 7, gall flowers; 8, male flower: *all enlarged.* (*Nos.* 6 *to* 8 *are copied from Miquel.*)

Receptacles on shortened branchlets (tubercles) from the stem and larger branches, never from the axils of the leaves: leaves alternate.

133. Ficus dimorpha, *nov. spec.*

A small tree; the young shoots deciduously hispid-tomentose. Leaves petiolate, sub-coriaceous, inequilateral, elliptic or obovate-elliptic; the apex acute, shortly cuspidate; the edges rather remotely dentate; the base rounded, slightly auricled on one side, 3-nerved, with an additional minute nerve in the auricled side; primary lateral nerves 6 or 7 pairs, not prominent; the under surface dull, harshly pubescent, especially on the midrib and nerves; the reticulations indistinct; upper surface glabrous and shining; length of blade 4·5 to 6 in.; petiole ·5 to ·75 in., pilose; stipules ovate-lanceolate, slightly pubescent externally, ·7 in. long. Receptacles pedunculate, in small fascicles from the stem and larger branches, of two forms:—(*a*) *Those containing gall and male flowers*, which are pyriform, truncate at the apex, gradually constricted at the base into a long, thin stalk at the union of which with the peduncle proper are three deciduous bracts; wrinkled, verrucose, pubescent; total length 2·5 in. of which the stalk forms more than half; breadth at apex 1 in.; peduncle proper ·5 in. Male florets numerous under the bracts of the mouth; stamen 1; perianth of 3 concave pieces. Gall florets elongate, with a short sub-terminal tyle; perianth minute, 3-cleft. (*b*) *Those containing fertile female florets*, turbinate, the apex concave and the umbilicus depressed; the base constricted into a stalk ·4 in. long; length 1 in., breadth 1·3 in.; peduncle proper ·2 in. Fertile female florets pedicellate; achene ovate-rotund; perianth undivided or splitting irregularly.

The elongate receptacles occur mostly on the stem, the globular on the branches. The former contain perfect male flowers and scales with rudimentary anthers and barren female flowers (galls); the latter perfect fertilised female flowers.

Mount Dempe, in Eastern Sumatra, at an elevation of about 3,000 ft.,—*Mr. H. O. Forbes* (Herb. No. 2175).

Plate 145B.—*F. dimorpha*, King. 1, apex of leafy branch; 2, receptacle from the stem, containing male and gall flowers; 3, receptacle from a branch, containing only perfect female flowers; 4, stipules—*all of natural size;* 5, male flower; 6, gall flower—*from the elongated receptacle;* 7, fertile female flower—*from the turbinate receptacle: enlarged.*

134. Ficus Hemsleyana, *nov. spec.*

A tree; the young shoots softly tomentose-pubescent. Leaves sub-sessile, membranous, slightly inequilateral, narrowly oblong or elongate-lanceolate; the apex produced into a long narrow tail; the base gradually narrowed, slightly auriculate on one side, 5-nerved; the edges sub-crenate; primary lateral nerves 5 to 6 pairs; under surface pubescent, especially on the midrib and nerves; the reticulations minute, not very distinct; upper surface glabrous; the midrib and nerves pubescent; length of blade 7 to 11 in.; petiole ·15 in. long, tomentose, adnate on one side to the auricle of the base of the blade; stipules ovate lanceolate, 2 to each leaf, scarious. Receptacles in clusters of 15 to 20 from tubercular, much shortened branches from the stem near the root; long-pedunculate, sub-globular, verrucose, scabrid, ·25 in. across; the apex truncate, and the umbilicus depressed; basal bracts none; peduncle slender, scabrid, ebracteate. Male flowers few and only amongst the scales at the mouth of the receptacle; stamen 1 or 2; the perianth of 2 lanceolate pieces which do not cover the anther or anthers. Gall flowers with a bluntly 4-toothed, gamophyllous perianth which almost envelopes the smooth, obliquely obovoid, elliptic ovary; style short, sub-terminal; stigma dilated, oblique. Fertile female flowers not seen.

Sarawak, in Borneo,—*Sig. Beccari* (Herb. Becc. P. B. No. 2335).

Plate 146.—*F. Hemsleyana*, King. 1, a stem-tubercle bearing fascicles of mature receptacles; 2, a single receptacle; 3, apex of the same; 4, stipules—*all of natural size;* 5, male flower; 6, gall flower; 7, ovary of gall flower: *enlarged.*

135. Ficus *Scortechinii, nov. spec.*

A small tree; the young shoots densely covered with adpressed, stiff, purplish-brown hairs which are ultimately deciduous. Leaves shortly petiolate, alternate, inequilateral, narrowly elliptic or obovate-elliptic; the apex rather suddenly, narrowly cuspidate; the base acute, minutely 3-nerved; the edges sub-crenate, undulate; primary lateral nerves 4 to 5 pairs, not prominent; lower surface with very numerous, minute, white tubercles and a few adpressed white hairs on the midrib, nerves, and reticulations; upper surface glabrous; length of blade 7 to 9 in.; petiole densely covered with stiff purplish brown hairs ·4 in. long; stipules 2 from the base of each petiole, lanceolate, acuminate, scarious externally, pilose like the petioles, ·35 in. long. Receptacles in fascicles of 5 to 8 from small tubercles on the stem, pedunculate, sub-globose, vertically ridged, glabrous; basal bracts 3, ovate, minute; peduncle ·35 in. long, pubescent. Fertile female flowers pedicellate; the perianth gamophyllous, very short, forming a tube round the lower half of the pedicel of the ovary; achene obliquely ovoid, minutely tuberculate; the style thin, about as long as the ovary, sub-terminal; stigma clavate. Male and gall flowers not seen.

Banks of the Kampo River, Perak,—*H. Kunstler* (King's Collector, No. 934).

This is a small tree, about 15 ft. high, which is apparently not common. The receptacles, when ripe, are of a russet brown colour.

PLATE 147.—*F. Scortechinii*, King. 1, apex of a leafy branch; 2, a fascicle of mature receptacles from the stem; 3, apex of receptacle; 4, base; 5, stipules—*of natural size;* 6 & 7, fertile female flowers: *enlarged.*

136. FICUS HARLANDI, *Benth. Fl. Hong-Kong*, 330.

A tree; the young branches with a few stiff hairs, ultimately glabrous. Leaves petiolate, membranous, alternate or opposite, elliptic-oblong or obovate-oblong; apex acute; edges entire; base cuneate, 5-nerved (2 of the nerves very small); primary lateral nerves about 8 pairs; under surface minutely tuberculate, the reticulations distinct; upper surface glabrous; length of blade 6 to 7 in.; petiole about 1 in.; stipules ovate-lanceolate, ·75 in. long. Receptacles in fascicles on contracted tubercled branches from the old wood, sub-globular, glabrous, with a few scattered bractlets on the sides, contracted at the base into a short stalk at the junction of which with the peduncle proper are 3 small glabrous bracts, ·5 in. across; peduncles proper ·3 in. to 1 in. Male flowers forming a sub-ostiolar zone, sessile; the perianth of 3 broad pieces, rather inflated; stamen ovate, acute; filament short, thick. Gall flowers pedicellate, without perianth; ovary smooth, obliquely obovoid, with short lateral style and tubular stigma. Fertile female flowers with short, narrow, tubular perianth which surrounds the lower part of the pedicel of the sub-rhomboid, minutely-tuberculate achene; the style elongate; stigma clavate, cylindric.

Hong-Kong,—*Harland, Hance.*

Mr. Bentham says this is not known out of the island of Hong-Kong. It is, however, closely allied to *F. fistulosa*, Reinw., of which it is, I suspect, only a form.

PLATE 148.—1, apex of leafy branch of *F. Harlandi*, Benth.; 2, fascicles of immature receptacles; 3, mature receptacle; 4, apex of the same; 5, stipule—*all of natural size;* 6, male flower; 7, gall flower; 8, fertile female flower: *all enlarged.*

137. FICUS CONDENSA, *nov. spec.*

A tree; the young shoots glabrous. Leaves thinly coriaceous, petiolate, ovate-elliptic, shortly acuminate; the edges entire; base slightly narrowed, boldly 3-nerved; primary lateral nerves 5 or 6 pairs, prominent like the midrib, coloured and very sparsely adpressed-pilose on the lower surface when young; in adult leaves both surfaces glabrous; the lower conspicuously but minutely white-tuberculate; length of blade 4 to 6 in.; petiole stout, ·6 in. to ·8 in. long; stipules lanceolate, scarious, ·8 in. long. Receptacles in densely crowded fascicles from very short tubercles on the stem and larger branches, pedunculate, pyriform, wrinkled, puberulous or glabrous; the apex truncate, the umbilical scales small, numerous, rather prominent; base constricted into a kind of stalk at the union of which with the peduncle proper are 3 small, ovate, basal bracts; peduncle proper ·35 in. long, puberulous. Male flowers with 3 concave perianth leaves; stamen 1; the anther elongate, narrow. Gall flowers without obvious perianth; ovary shortly pedicellate, ovoid-globose, smooth; style rather short, lateral; stigma large, discoid. Fertile female flowers unknown. Mature receptacles not seen.

Borneo,—*Sig. Beccari* (Herb. Becc. No. 857).

The very densely fasciculate, glabrous, receptacles are distinctive of this species.

PLATE 149.—*F. condensa*, King. 1, apex of leafy branch; 2 & 3, fascicles of immature receptacles from branches; 4, a single immature receptacle; 5, apex of the same; 6, basal bracts; 7 stipules—*all of natural size;* 8, young male flower; 9, old male flower; 10 & 11, gall flowers: *enlarged.*

Receptacles in the axils of the leaves, or in fascicles from the stem or larger branches; the leaves alternate or opposite.

138. FICUS FISTULOSA, *Reinw. in Bl. Bijd.* 470; *Kurz Fl. Brit. Burmah* ii. 459 (*in part*).—*F. sub-opposita*, Miq. (*sub Covellia*), Pl. Jungh. 66; Choix des Plantes de Buitenzorg, tab. xv.; Fl. Ind. Bat. i. pt. 2. 327; Suppl. 175, 435.—*F. geminifolia*, Miq. in Zoll. Syst. Verz. p. 93; Fl. Ind. Bat. i. pt. 2. 313.—*F. tengerensis*, Miq. in Ann. Mus. Lugd. Bat. iii. 296.—*Covellia tuberculata*, Miq. in Zoll. Syst. Verz. 94, 99; Fl. Ind. Bat. i. pt. 2. 325.—*F. diphylla*, Wall. Cat. No. 4543.—*F. Hullettii*, King MSS.

A small tree or shrub; the young shoots with a few stiff, adpressed hairs, especially at the swollen annular nodes, otherwise glabrous. Leaves alternate or opposite, petiolate, membranous or sub-coriaceous, ovate-lanceolate, obovate-lanceolate, oblong or elliptic, sometimes inequilateral; the apex acute or shortly acuminate; the edges entire, rarely remotely sub-serrate; the base rounded or narrowed, sometimes unequal, 3-nerved; primary lateral nerves 4 to 7 pairs, spreading, rather prominent and coloured beneath, as are the secondary nerves and reticulations; both surfaces quite glabrous, the lower minutely tuberculate; length of blade 3·5 to 7 and even 10 in.; petioles often slightly unequal on the same plant, ·5 in. to 1·5 in. long; stipules ovate-lanceolate, scarious, ·5 to ·75 in. long. Receptacles pedunculate, axillary, in pairs or solitary, or in small fascicles from tubercles on the larger branches below the leaves or from the main stem; when young, sometimes sub-pyriform; when mature, depressed-globose, glabrous, about ·6 in. in diameter (occasionally nearly 1 in.), sometimes verrucose and constricted into a short stalk at the base; umbilical scales numerous; basal bracts 3, small, ovate-acute; peduncle proper ·25 in. to 1·5 in. in the receptacles borne on the stem. Male flowers few just under the ostiole, the perianth of 2 or 3 concave, much imbricated pieces which tightly embrace the single stamen; filament rather long, thick. Gall flowers without any evident perianth, or with a very short, hyaline, gamophyllous perianth, which surrounds the base of the pedicel of the ovary; ovary ovoid, smooth; the style short, sub-terminal; stigma infundibuliform. Fertile female flowers sub-sessile or pedicellate; perianth as in the gall flowers; achene obliquely obovoid, minutely tuberculate; style as long as the achene, lateral; stigma cylindric.

The Malayan Archipelago and Peninsula, Burmah, Chittagong, and Khasi Hills.

This is a widely distributed species and, as might therefore be expected, it presents considerable variations in form. In some individuals the receptacles are all axillary and shortly pedunculate; in others they are all in fascicles on the stem and older branches, and long pedunculate, and the latter as a rule contain only fertile female flowers. As regards the covering of both the gall and the fertile female flowers, there is want of uniformity; some being without any apparent perianth, while others have a very short, hyaline, gamophyllous perianth which surrounds the base of the stalk of the ovary. The leaves also present some variety both in form and texture. The form which is very common about Singapore, and which Wallich issued as No. 4543 of his catalogue under the name of *F. diphylla*, has lanceolate, suddenly acuminate leaves. The leaves of most of the forms are membranous in texture; but in Sumatra and Western Java there occurs a form with small sub-coriaceous leaves, to which Miquel gave the name *F. tengerensis:* the leaves of this last are also sometimes serrate.

I have carefully examined the types of all the species which I have reduced here, and I have dissected about forty of their receptacles. I have compared these with Reinwardt's type specimen of *F. fistulosa* in the Leiden Herbarium, and I see no reason for keeping any one of them distinct from Reinwardt's species.

PLATE 150.—*F. fistulosa*, Reinw. (stem-fruiting form). 1, apex of a leafy branch; 2, leaf with much narrowed base (from another plant); 3, a fascicle of mature receptacles; 4, apex of receptacle; 5, stipules—*all of natural size;* 6, pedicellate fertile female flower, with short gamophyllous perianth; 7, sub-sessile fertile female without apparent perianth: *enlarged.*

PLATE 151.—*F. fistulosa*, Reinw. (form with axillary receptacles). 1, apex of a fruiting-branch of the form called *F. diphylla* by Wallich; 2, leaf of another form with more numerous primary lateral nerves and less acuminate apex; 3, receptacles from stem below the leaves—*of natural size;* 4 & 5, male flowers with the perianth opened out; 6, gall flower with short gamophyllous perianth; 7 & 8, pedicellate gall flowers without apparent perianth; 9 & 10, fertile female flowers with perianth; 11 & 12, fertile female flowers without perianth: *all enlarged.*

139. FICUS SÆMOCARPA, *Miq. Ann. Mus. Lugd Bat.* iii. 232, 296.—*F. pyrrhocarpa*, Kurz For. Flora Brit. Burmah ii. 457; Brandis For. Flora, 424.—*F. tuberculata*, Wall. Cat. 4539 (not of Roxb.).—? *F. squamosa*, Roxb., and *F. laminosa*, Hardw., Roxb. Fl. Ind. iii. 531.

A low, spreading shrub; the young branches and petioles densely but deciduously hirsute. Leaves opposite, crowded, thickly membranous, petiolate, narrowly lanceolate or oblanceolate, with acuminate apex and entire edges; the base very gradually narrowed to the petiole, 3-nerved; lateral primary nerves about 6 to 8 pairs; secondary nerves and reticulations fine but distinct, and with the midrib minutely strigose on the lower surface when young, often becoming glabrescent when adult; the rest of the lower surface glabrous, smooth, or scabrid from numerous minute white tubercles (rarely hispid-puberulous); upper surface smooth (rarely scabrid); length of blade 3 in. to 9 in.; petioles ·3 to ·9 in. long; stipules persistent, scarious, in pairs, ovate-acuminate, glabrous, with a line of hairs along the midrib externally, from ·3 to ·6 in. long. Receptacles pedunculate, solitary in the axils of leaves or of fallen leaves, or on short, leafless branches from the old wood, sub-globose, constricted at the base, with a prominent, large-bracted umbilicus, and a few glabrous bracts irregularly scattered on their sides; tomentose-hispid, verrucose, 8- or 10-ribbed, brownish when ripe, from ·5 in. to 1 in. across; basal bracts 3, triangular, deciduous; peduncle ·2 in. to ·6 in. long, pubescent. Male flowers with a perianth of three or four pieces; the single anther ovate or obovate. Gall perianth hyaline, closely applied to the smooth ovary; style short, lateral; stigma tubular. Fertile female flowers with perianth like the galls; the achene rhomboid, hairy, with very long, filamentous, hairy style.

In sand and in crevices of rocks, in the dry beds of streams along the base of the Himalaya from Dehra Dhoon to Bhotan; in similar situations in the Khasi Hills; and in Assam and Burmah.

There is a little variability as to pubescence in this species, the leaves of some specimens being nearly glabrous even on the lower surface, while others are hispid-pubescent everywhere on both surfaces. This species approaches *F. hispida*, Linn. fil. It is found nowhere except in the beds of streams, and is in all likelihood a form of *hispida* modified with reference to such situations. I have little doubt this is the plant intended to be described by Roxburgh as *F. squamosa* and by Hardwicke as *F. laminosa;* but the descriptions of both authors are too meagre for exact identification, and neither authentic specimens nor drawings are now extant.

Plate 152.—*F. sæmocarpa*, Miq. 1, leaf-twig with young axillary receptacles; 2, branch bearing ripe receptacles; 3, apex of a receptacle; 4, vertical section of a receptacle—*of natural size;* 5 male flower; 6, gall flower; 7, fertile female flower (from a Sikhim specimen); 8, fertile female flower (from a Khasia specimen): *all enlarged.*

140. Ficus obpyramidata, *nov. spec.*

A small tree; the young shoots covered with deciduous brown tomentum. Leaves petiolate, sub-coriaceous, ovate-elliptic, sometimes sub-obovate-elliptic; the apex acute, subentire, minutely undulate; base rounded or slightly cordate, 7-nerved (2 of the nerves minute); primary lateral nerves about 6 pairs, like the midrib rather prominent below; the lower surface dark-coloured, pubescent, especially on the midrib and nerves; the reticulations minute and rather distinct; upper surface shortly adpressed-hispid; length of blade 6 to 7 in.; petiole ·5 to 1 in., tomentose; stipules ovate-lanceolate, pilose externally, ·7 in. long. Receptacles in small fascicles from shortened, leafless branches from the stem, pedunculate, inversely pyramidal, about 1 in. across at the apex; the sides with many vertical ridges, verrucose, puberulous; the umbilicus depressed; basal bracts 3, minute. Male and gall flowers unknown. Fertile female flowers with the perianth reduced to a ring which surrounds the base of the pedicel of the ovary; achene ovoid, minutely tubercled, viscid; the style long, sub-terminal; stigma cylindric or sub-clavate.

At Laroot, in the Province of Perak,—*Kunstler*, No. 1849. A tree, from 25 to 30 ft. high.

Plate 153.—*F. obpyramidata*, King. 1, apex of leafy branch; 2, fascicle of mature receptacles from the stem; 3, apex of mature receptacle; 4, base of same; 5, stipules—*all of natural size;* 6, fertile female flower: *enlarged.*

141. Ficus hispida, *Linn. fil. Suppl.* 442; *Bl. Bijd.* 469 (*cum syn. Rheede*); *Benth. Fl. Hong Kong*, 329; *Fl. Austr.* vi. 176; *Bedd. Fl. Sylv.* 224; *Brandis F. Flora*, 423; *Kurz Fl. B. Burmah* ii. 460; *Miq.* in *Ann. Mus. Lugd. Bat.* iii. 282, 296.—*F. oppositifolia*, Willd. Spec. iv. 1151; Roxb. Corom. Pl. t. 124; Fl. Ind. iii. 561; Wight's Icon 638; Griff. Ic. Pl. As. t. 563 (*sub Covellia*); Gasp. Rich. 85; Dalz. and Gibs. Fl. Bombay 243.—*F. scabra*, Jacq. Hort Schoenbr. iii. t. 315.—*F. mollis*, Willd. Hort. Berol. 1798. 103. t. 5.—*F. prominens*, Wall. Cat. 4537, Miq. in Ann. Mus. Lugd. Bat. iii 291.—*F. dæmonum*, Koenig in Roxb

Fl. Ind. ii. 562; Wight's Icon 641.—*Cov. dæmonum*, Dalz. & Gibs. Fl. Bomb. 244; Wall Cat. 4538 A. to N.—*Covellia oppositifolia, dæmonum, setulosa, Courtallensis, Wightiana, Assamica*, and *dasycarpa*, Miq. in Lond. Journ. Bot. vii. 461 to 564.—*Cov. hispida*, Miq. in Lond. Journ Bot. l.c. and Fl. Ind. Bat. i. pt. 2. 323.

A shrub or small tree; all the parts more or less hispid-pubescent; the branches and, in Malayan specimens, the upper surfaces of the leaves sometimes glabrescent when old. Leaves usually opposite, petiolate, membranous, ovate, ovate-oblong or elliptic to sub-obovate-elliptic, apiculate or shortly and abruptly acuminate; edges dentate or entire in old leaves; base rounded, emarginate, slightly cordate or narrowed and sub-cuneate; 3- to 5-nerved; primary lateral nerves 3 to 5 pairs; secondary nerves rather straight; reticulations fine; the lower surface hispid-pubescent, the upper hispid-scabrid; length 4 to 9 in. (in young shoots as much as 12 in.); petioles from ·5 to 1·5 in. long (in young shoots often 3 to 3·5 in.); densely hispid-pubescent; stipules 2 to each leaf, ovate-lanceolate, pubescent externally, glabrous internally, about ·5 in. long, often in whorls of four on the receptacle-bearing, leafless branches. Receptacles shortly pedunculate, turbinate, obvoid, or sub-pyriform, slightly umbonate, hispid, and sometimes with bracts scattered along their sides; yellowish when ripe, and from ·5 to 1 in. across; umbilicus rather large; basal bracts 3, borne on peduncles ·2 to ·6 in. long; in pairs from the axils of the leaves, or in fascicles from shortened tuberculate branches from the old wood, or in pairs or fascicles on elongate, stipular, bracteate, sometimes leafy branches issuing from the larger branches or stem, and often reaching to, or even penetrating, the soil. Male flowers rather numerous near the apex of the receptacles containing the galls; the perianth of 3 concave hyaline pieces; stamen 1; the anther broad, filament short. Gall flowers pedicellate, with no obvious perianth; the ovary smooth, globular; style short, sub-terminal; stigma dilated. Fertile female flowers like the galls as regards perianth; the achene ovoid; the style long, lateral, hairy; the stigma cylindric tubular.

Common over the whole of India up to elevations of about 3,500 ft.; Malayan Peninsula and Archipelago, Hongkong, Australia.

This species, being so widely distributed, presents considerable variety in form. In the majority of plants the leaves are quite opposite; in others they are distant and scattered, with no tendency to become opposite: in some the receptacles are axillary, in others they are entirely borne on the branches issuing from the stem near the root, while in others they occupy both situations. Roxburgh says that on the sandy beaches of the Coromandel Coast the receptacles are often hypogœal, and to this hypogœal form he gave the specific name *dæmonum;* but in no other respect does this Coromandel form present any peculiarities. In Malayan specimens of this species the upper surface of the leaves is almost glabrous. The male flowers in this, as in most species of *Covellia*, are few compared to the females.

Plate 154.—*F. hispida*, Linn. fil. 1, apex of branch of opposite-leaved form, with 2 axillary receptacles; 2, 2, 2, fig-bearing leafless branch, with whorls of stipules and immature receptacles; 3, vertical section of immature receptacle—*all of natural size;* 4, abortive male flower; 5 & 6, three perfect female flowers: *enlarged.* (*Nos. 4 and 5 are from the same receptacle.*)

Plate 155.—*F. hispida*, Linn. fil. 6, apex of leaf-branch of alternate-leaved form: 7, stem with fig-bearing, leafless branch; 8, vertical section of a receptacle containing perfect male and gall flowers—*of natural size;* 9, male flower; 10, gall flower from the same receptacle: *enlarged.*

142. FICUS LEPICARPA, *Bl. Bijd.* 459; *Miq. in. Ann. Mus. Lugd. Bat.* iii. 283, 297. —*F. volkameriæfolia*, Wall. Cat 4542.—*Covellia didyma*, Miq. Pl. Jungh. 65; Fl. Ind. Bat. i. pt. 2. 327.—*Covellia lepicarpa*, Miq. Fl. Ind. Bat. i. pt. 2. 328. —*Covellia volkameriæfolia*, Miq. in Lond. Journ. Bot. vii. 464. tab. 8.

A small tree; the young branches swollen at the nodes, deciduously pubescent. Leaves petiolate, thickly membranous, alternate or sub-opposite, obovate-oblong; the apex shortly and abruptly acuminate; margin entire, rarely sub-repand towards the apex; the base much narrowed, often unequal, 5-nerved (2 of the nerves minute); primary lateral nerves 7 or 8 pairs, erect, rather straight; secondary nerves straight, parallel, prominent on the lower surface which is glabrous and minutely tuberculate; upper surface glabrous except the midrib and nerves which are pubescent; length of blade 7 to 10 in.; petioles ·75 to 1·25 in.; stipules large, rather long persistent, ovate-lanceolate, scarious, ·75 in. to 1 in. long. Receptacles sessile, axillary, usually solitary, ellipsoid, sides sparsely and coarsely pubescent, with many white warts and a row of large flat, often white-tipped, bracts below the umbilicus; umbilical bracts numerous; basal bracts 3, ovate-acuminate, spreading. Male flowers very few, near the mouth of the receptacles containing gall flowers, sessile, short, broad; the perianth of 3 membranous, inflated pieces; stamen 1, its filament adnate, stout, curved. Gall flowers half-ovoid; the style terminal; stigma much dilated; the perianth a pellucid sac enveloping the whole pistil except the stigma. Fertile female flowers pedicellate; the perianth small, shorter than the stalk of the ovary, gamophyllous, with minute irregular teeth; achene obliquely obovoid, minutely tuberculate; the style lateral, elongate; stigma cylindric.

Java, Sumatra, Perak,—*King's Collector*, Nos. 1836, 1902, 2013.

In crevices of rocks, in the beds and by the sides of streams up to elevations of 3,500 ft. Miquel describes the receptacles as sometimes long-pedunculate and borne on tubercles on the stem, but I have nowhere seen any specimen showing this arrangement, and Mr. H. O. Forbes, who collected many examples of the plant in Java and Sumatra, and who made notes and sketches at the time of collection, describes the receptacles as always axillary. So also does Mr. Kunstler, who collected it in Perak. Receptacles containing male flowers are rare, and I had to examine a large number of receptacles before I found one. In that receptacle the males were but few in number, and lay quite close to the scales under the mouth: in the same receptacle the gall flowers were young, and it is possible that the half-ovoid shape which I have figured might have become modified with maturity. Although receptacles containing true female flowers are very numerous, not many embryo-containing achenes are to be met with, for a large proportion of the female flowers are never fertilised. These unfertilised flowers differ from the fertilised in having the pericarp of the achene more membranous and slightly tubercular on the surface: in form the two sorts are alike.

In *Botanische Zeitung* for 1885, at page 538, Count Solms Laubach mentions two trees bearing the name *lepicarpa* in the Botanic Garden of Buitenzorg, namely, No. 5, *Covellia lepicarpa*, Miq. (the "Boekoe Boekoe" of Sumatra), with yellow milk and axillary receptacles, in which he found only male and gall flowers; and No. 6, *Covellia lepicarpa*, var. Bunjeng, with white milk and receptacles borne on the stem, in which he found only fertile female flowers. I cannot reconcile my account of *F. lepicarpa*, Miq. with either Count Solms Laubach's No. 5 or 6. In *F. lepicarpa*, Miq., as I understand it, I find receptacles containing male flowers to be very scarce, but those containing fertile female flowers very plentiful. The fertile female flowers which Count Solms Laubach (l.c. taf. v. figs. 6, 7, 8) attributes, and no doubt correctly, to *F. stictocarpa*, Miq., agree in all particulars, except the hairs on the style, with those which I find in *F. lepicarpa*, Miq. The depressed globular figs of Count Solms Laubach's yellow-juiced *F. lepicarpa* (No. 5, "Boekoe Boekoe") appear to me to be probably those of *F. stictocarpa*, Miq. (*F. leucantatoma*, Poir.)

Plate 156.—*F. lepicarpa*, Miq. 1, branch with immature receptacles; 2, branch with mature receptacles; 3, single, nearly mature, receptacle; 4, vertical section of a receptacle; 5, stipules—*all of natural size*; 6, unexpanded male flower; 7, anther—*side view*; 8, anther—*front view*; 9 & 11, gall flowers; 10, fertile female flower: *all enlarged.*

143. Ficus leucantatoma, *Poir. Encyclop. Method. Suppl.* ii. 654; *Ann. Mus. Lugd. Bat.* iii. 283, 296.—*F. venosa*, Willd. Hort. Berol. p. 36. t. 36 (not of Ait.)—*F. leucoma*, Roem. et Sch. Syst. i. 561.—*F. leucopleura*, Bl. Bijd. 443.—*F. rapiformis*, Roxb. Fl. Ind. iii. 551; Wight's Icon 637; Miq. in Ann. Mus. Lugd. Bat. iii. 282, 296.—*F. stictocarpa*, Miq. in Ann. Mus. Lugd. Bat. iii. 284, 297.—*Covellia stictocarpa*, Miq. Pl. Jungh. 65; Fl. Ind. Bat. i. pt. 2. 327. t. 23A.—*F. septica*, Rumph. Herb. Amb. iii. 153. t. 96.—*F. radiata*, Dcne. in N. Ann. Mus. iii. 494; Miq. in Ann. Mus. Lugd. Bat. iii. 284, 297.—*Covellia radiata*, Miq. Fl. Ind. Bat. i. pt. 2. 328.—*F. Oldhami*, Hance Advers. in Stirp. Crit. in Ann. Sc. Nat. 5 Ser. vol. 5. 242; Maxim. in Bull. Acad. St. Petersb. xi. 334.—*Covellia venosa*, Miq. in Lond. Journ. Bot. vii. 468; Fl. Ind. Bat. i. pt. 2. 326.—*Covellia leucopleura*, Miq. Fl. Ind. Bat. l.c. 326.—*Covellia rapiformis*, Miq. in Lond. Journ. Bot. vii. 464; Fl. Ind. Bat. i. pt. 2. 325.—? *Covellia grandifolia*, Miq. *ibid.* Suppl. 434.—*Cystogyne leucosticta*, Gasp. Rich. 84.

A galbrous tree; the young branches thick, annulate. Leaves opposite or alternate, sub-coriaceous, petiolate, ovate or elliptic, sometimes ovate-rotund; the apex blunt or shortly acuminate; the edges entire; base broad, rounded or emarginate, 3 to 5-nerved; lateral primary nerves 5 to 7 pairs, prominent and coloured beneath as also are the minute but very distinct reticulations; both surfaces glabrous; length of blade 6 to 12 in.; petioles ·75 to 1·5 in.; stipules ovate-lanceolate, glabrous, from 1·5 in. to 2 in. long, early deciduous. Receptacles shortly pedunculate, axillary, in pairs, depressed-globose, with about 10 to 12 vertical ridges and many white rough warts, otherwise nearly glabrous; when ripe about ·75 in. across, umbilicus depressed; basal bracts 3, ovate-obtuse; peduncle ·25 in. long. Male flowers few, near the ostiole, sessile; the perianth of 3 broad, much-imbricated, membranous pieces; stamen 1, with an adnate, curved filament. Gall flowers sessile or pedunculate, with a gamophyllous, toothed, hyaline perianth; the ovary rounded, smooth; the style short, lateral; the stigma dilated, cup-shaped. Fertile female flowers with a short, gamophyllous, 2- to 3-toothed perianth which embraces the base of the pedicel of the obliquely-ovoid, minutely-tubercular achene; the style longer than the achene, lateral, bearing a few hairs; stigma clavate.

Java and other of the Malayan islands, from the sea level up to 3,000 ft.

This species, although not an uncommon plant in the Malayan islands, is very poorly represented in both the Dutch and English collections. It is sometimes cultivated in gardens in the tropics and in stoves in Europe, on account of its handsome white nerved leaves, under the names *F. eburnea* and *F. venosa.* The latter is the name under which Willdenow figures it (*Hort Berol.*). This name *venosa* forms part of some synonymy which I have tried to disentangle in my remarks under *F. infectoria*, Roxb. I reduce to *leucantatoma F. stictocarpa*, Miq.; for although Miquel (*Fl. Ind. Bat.* i. pt. 2. 327) gives the number of the primary lateral nerves of the leaves of *stictocarpa* as 10 to 15, his type specimen in Utrecht Herbarium is only 10-nerved; and in other respects it appears to me to fall here. This species was introduced from the Moluccas into the Botanic Garden, Calcutta, in Roxburgh's time. It was named by him *F. rapiformis*, and is still cultivated at Calcutta under this name. The receptacles borne by the Calcutta plants contain uniformly male and gall flowers: I have never found receptacles with fertile females.

Covellia grandifolia, Miq., a species founded on leaves only, appears to fall here. I have examined the type specimen of this and, except that the leaves are very large (18 inches long), I cannot see how it differs from Roxburgh's unpublished figure of his *rapiformis* in the Calcutta Herbarium. After careful examination at Kew of the type specimens of *F. Oldhami*, Hance (Herb. Oldham, No. 553), I cannot see how they differ from this species. Cuming's Philippine specimens Nos. 1922 and 1923 were referred (the latter doubtfully) by Miquel (*Lond. Journ. Bot.* vii. 435) to *F. altimeeraloo*, Roxb. (= *gibbosa*, Bl.); but they appear to me to fall under this, as also does Motley's Labuan specimen (*Herb. Mottl.*, No. 208). Miquel (in *Ann. Mus. Lugd. Bat.* iii. 296) reduces here his own species *Covellia composita;* but his description of that species (*Fl. Ind. Bat.* i. pt. 2. 324) does not in the least suggest *leucantatoma*, Poir; and I think the reduction must have been made by an oversight. Count Solms Laubach has made some interesting remarks (*Botanische Zeitung*, vol. for 1886, pp. 535, 6) on the female flowers of a specimen named *F. stictocarpa* by Miquel himself, and the Count gives excellent figures of these flowers (l.c. taf. v. figs. 6, 7, 8). These three figures agree perfectly with my dissections of the female flowers of a yellow-milked *Ficus* cultivated in the Buitenzorg Garden without a name, but which I regard as *F. leucantatoma*, Poir. I have a strong suspicion that the plant referred to by the same distinguished author as "No. 5, *Covellia lepicarpa*, Miq., Boekoe Boekoe," is also *stictocarpa*, and not the true *F. lepicarpa*, as I understand that species. My reasons for suspecting this are the yellow colour of the milk of No. 5 *Covellia* and the shape of its receptacles as figured by Count Solms Laubach (l.c. taf. v. figs. 9 and 10). Yellow colour in the juice is an uncommon character in the genus *Ficus*, and every specimen with this character which I have yet seen I would on other grounds, without hesitation, refer to this species. I am thus inclined to think that yellow milk may possibly be found to be a diagnostic mark of the species *leucantatoma*.

PLATE 159.—*F. leucantatoma*, Poir. Branch with mature receptacles. 1, receptacle—*seen from below*; 2, the same from above; 3, vertical section of receptacle—*of natural size;* 4, unexpanded male flower; 5, male flower opened out; 6, side view of anther; 7 & 8, gall flowers, sessile and pedicellate; 9, fertile female flower: *all enlarged.*

Eusyce.—*Flowers unisexual; male and gall flowers in one set of receptacles; fertile female flowers in a distinct set of receptacles; male flowers with 2 stamens. The receptacles small, axillary. Scandent or erect shrubs or small trees, rarely epiphytal; the leaves alternate, softly hairy or glabrous, not scabrid or hispid.* Exceptions.—*All three kinds of flowers in the same receptacle in Nos.* 145, 191, *and* 192; *three to six stamens in No.* 170; *sometimes three stamens in Nos.* 149, 163, 173, *and* 191; *one stamen in No.* 192, *and sometimes in Nos.* 163, 164, 171, *and* 173; *receptacles large in Nos.* 144, 149, 169, *and in some varieties of* 154: *receptacles hispid in No.* 174 *and a rudimentary pistil sometimes present in the male flowers.*

Scandent or Creeping Shrubs.

Leaves dimorphous, those of the receptacle-bearing branches much larger than those of the stem.

Leaves of stem alike in shape; receptacles 1 inch or more in diameter . . . . 144 *F. pumila.*

Leaves of stem polymorphous; receptacles less than half an inch in diameter . . . . 145. *F. Thwaitesii.*

Leaves obovate, rarely more than 1 *inch long.*

Receptacles sub-sessile, ovoid . . . . 146. *F. vaccinioides.*

Receptacles pedunculate, pyriform . . . . 147. *F. disticha.*

Leaves ovate-rotund.

Apices of leaves rather blunt; receptacles sessile, in axillary clusters . . . . 148. *F. excavata.*

Apices of leaves caudiculate; receptacles more than half an inch in diameter, on long peduncles . . . . 149. *F. laevis.*

Leaves broadly ovate, or ovate-elliptic, the length not twice the breadth.
Adult leaves glabrous; young shoots not rufous . . . . . . 150. *F. scandens.*
Adult leaves pubescent below; young shoots rufous . . . . . 151. *F. obtusa.*

Leaves oblong, their length considerably more than twice their width.
Leaves glabrous or nearly so when adult.
Receptacles on long peduncles . . . . 152. *F. allutacea.*

Receptacles on short peduncles.
Receptacles with annular umbilicus . . . . 153. *F. recurva.*

Receptacles with bracteolate umbilicus.
Usually solitary, puberulous when ripe . . . . 154. *F. foveolata.*
Solitary or in pairs, often in fascicles, glabrous when ripe . . . . 155. *F. ramentacea.*

Leaves hairy beneath.
Leaves araneose, as are also the receptacles . . . . . . 156. *F. araneosa.*
„ densely fulvous-villose; receptacles depressed-globular, glabrous . . . . 157. *F. lanata.*
„ densely fulvous-villose; receptacles ovoid, villous . 158. *F. villosa.*
„ sparsely pilose or sub-strigose; receptacles depressed-globular, umbilicus annular . . . . 153. *F. recurva.*
„ with the nerves only silky or villous, otherwise glabrous; adult receptacles glabrous . . . . 159. *F. crininervia.*

Erect Shrubs, or Trees.

Leaves dimorphous (from cuneate to lanceolate).
Midrib always bifurcate in the cuneate leaves . . . . 160. *F. diversifolia.*
„ sometimes „ „ „ . . . . . 161. *F. oligoneura.*

Leaves pandurate . . . . 162. *F. pandurata.*

Leaves obovate-oblong.
Receptacles not constricted at the base . . . . 163. *F. erecta* and its var. *Beecheyana.*

Receptacles slightly constricted at the base.
Peduncles not more than ·25 inch long.
Leaves flocculent below . . . . 164. *F. tricolor.*
Leaves not flocculent below . . . . 165. *F. glandulifera.*

Peduncles more than ·25 inch, but not more than ·5 inch long . . . . 166. *F. Moseleyana.*

Receptacles constricted at the base into a distinct stalk as long as, or longer than, the peduncle proper.
Leaves densely and softly pubescent on the under surface 167. *F. macropoda.*
Leaves rather harshly adpressed-pubescent on the under surface . . . . 168. *F. pedunculosa.*

- *Leaves large, broadly ovate-elliptic, deeply cordate at the base, lower surface rufous-flocculent* . . . . 169. *F. toxicaria.*
- *Leaves broadly ovate, often more or less deeply lobed.*
    - Receptacles pedunculate . . . . 170. *F. palmata.*
    - Receptacles sessile.
        - Lower surface of leaves densely covered with minute white or cinnamoneous tomentum; adult receptacles smooth . 171. *F. alba.*
        - Lower surface of leaves with rather harsh, tawny, tomentum; adult receptacles tomentose . . . . 172. *F. fulva.*
        - Lower surface of leaves with rufous tomentum; receptacles rufous, hispid-tomentose . . . . 173. *F. hirta.*
        - Lower surface of leaves sparsely hispid; adult receptacles glabrous . . . . 174. *F. dumosa.*
- *Leaves elliptic, oblong-lanceolate or oblanceolate, hispid-pubescent; perianth tufted, ciliate* . . . . 175. *F. chrysocarpa.*
- *Leaves ovate-oblong, sometimes irregularly lobed; under surface glabrous, except the midribs and nerves which are adpressed-pubescent; receptacles smooth* . . . . 176. *F. Schefferiana.*
- *Leaves oblanceolate.*
    - Apex of leaves rather blunt; primary nerves about 10 pairs, horizontal . . . . 177. *F. variolosa.*
    - Apex of leaves acuminate or cuspidate.
        - Primary nerves of leaves 6 to 8 pairs . . . . 178. *F. Formosana.*
        - Primary nerves of leaves 3 to 4 pairs . . . . 179. *F. Silhetensis.*
- *Leaves elliptic, with acuminate apices and broad bases.*
    - Receptacles both axillary and in fascicles from the stem . . . . 180. *F. duriuscula.*
    - Receptacles axillary.
        - Leaves narrowly ellipitic, nerves horizontal . . . . 181. *F. macilenta.*
        - Leaves broadly elliptic, nerves ascending.
            - Receptacles sub-pyriform, ·25 inch in diameter . . . 182. *F. Comitis.*
            - Receptacles sub-globular, 1 inch in diameter . . . . 183. *F. Odoardi.*
- *Leaves elliptic, narrowed to each end; under surface with short white hair* . . . . 184. *F. leucoptera.*
- *Leaves lanceolate.*
    - Receptacles pedunculate, constricted at the base into a distinct stalk.
        - Gradually constricted . . . . 185. *F. pyriformis.*
        - Suddenly „ . . . . 163. *F. erecta,* var. *Sieboldii.*
    - Receptacles ovoid, sub-sessile.
        - Leaves membranous . . . . 179. *F. Silhetensis.*
        - Leaves coriaceous . . . . 186. *F. Mottleyana.*

Receptacles globular.
  Sessile, or nearly so . . . . 187. *F. chartacea.*
  Shortly pedunculate.
    Leaves sub-coriaceous, narrowed to base . . . . 188. *F. oleæfolia.*
    Leaves membranous.
      Receptacles sparsely strigose . . . . 189. *F. pauper.*
      Receptacles minutely tuberculate . . . . 190. *F. Soronensis.*

All three kinds of flowers in the same receptacle (as in Urostigma).

Male flowers 2- or 3-androus . . . . 191. *F. nemoralis.*
Male flowers 1-androus . . . . 192. *F. lepidosa.*

Scandent or Creeping Shrubs.

144. FICUS PUMILA, *Linn. Sp. Pl. ed.* 1. 1060; *Kaempf. Am. Exot.* 803. *t.* 804.—*F. pumila var. a Thunb.*, Fl. Jap. 33; Maxim. in Bull. Acad. St. Petersb. xi. 341.—*F. stipulata*, Thunb. (pl. sterilis) et *F. pumila* (pl. fertilis), Thunb. Ficus 8; Sieb. Syn. Pl. Œcon, No. 174; Miq. in Lond. Journ. Bot. vii. 439; in Ann. Mus. Lugd. Bat. ii. 199. iii. 294; in Journ. Bot. Neerl i. 243; Benth. Fl. Hong-Kong, 328; Fl. Austr. vi. 171; Maxim. Bull. Acad. St. Petersb. xi. 342.—*Tenorea heterophylla*, Gasp. Rich. 81.—*Plagiostigma stipulata* and *pumila*, Zuccarini, Abh. Bayr. Akad. iv. 1. 154. t. 1. fig. 6—9; Hance in Seem. Journ. Bot. iv. 54.—*F. Hanciana*, Maxim. in Bull. Acad. St. Petersb. xi. 341.—*F. erecta*, auctor. plur. sed non Thunb.

A scandent or creeping shrub with dimorphous leaves, rooting freely from the stem and the small-leaved barren branches. Fruiting-branches erect or spreading, not rooting; while young fulvous-pubescent, as are also the petioles and young receptacles; leaves petiolate, thickly membranous, ovate or ovate-elliptic, with sub-acute, bluntish apex, entire edges, and cordate, 7-nerved, equal-sided base; lateral primary nerves 4 to 5 pairs, prominent on the lower and depressed on the upper surface; secondary nerves also prominent, and the reticulations very strong, distinct, areolar on the under surface, which is minutely pubescent; upper surface glabrous except the midrib and main nerves, which are pubescent; length of blade 2·5 to 3 in.; petioles ·4 in.; stipules 2 to each leaf, linear-lanceolate, fulvo-sericeous externally. Leaves of the stem and barren branches ovate-cordate and slightly oblique at the base, 1 in. and under in length, with very short (·1 to ·15 in. long) petioles. Receptacles borne only on the spreading, large-leaved branches, pedunculate, solitary, axillary, pyriform, with the apex truncate; umbonate, with rather prominent umbilicus; when full grown about 2 in. long and 1·25 in. across, and of a beautiful purple colour; basal bracts 3; peduncle thick, pubescent, ·5 in. long. Male flowers numerous towards the apex of the receptacles, very large, on pedicels of varying length (some of them ·5 in. long); perianth of 2 or 3 distinct pieces; anthers 2, narrowly elongate, placed face to face, nearly sessile. Female flowers in the same perianth with the males, barren; the perianth of 4 or 5 distinct pieces; achene sub-globular, smooth; style lateral; stigma oblique, dilated. Fertile female flowers unknown.

Indigenous in Japan and China: frequently cultivated against walls and other buildings in all parts of the plains of India. This species produces receptacles freely in the Botanic Garden, Calcutta, where the rather untidy fruiting-branches are allowed to grow freely. In most other Indian gardens these fruiting-branches are trimmed off, and receptacles are therefore never seen. Considerable confusion has arisen in the nomenclature of this plant from the dimorphism of its leaves. Its synonymy has been very carefully disentangled by Maximowicz in an excellent paper in vol. xi of the Bulletin of the St. Petersburg Academy, and, in treating it, I have to a great extent followed this author.

In the Botanic Garden, Calcutta, the perianth of the male flowers consists invariably of two pieces. Japanese specimens, however, have a 3-leaved male perianth. In Calcutta the receptacles produced are all of one kind, containing males which, although of enormous size, produce no good pollen, and galls which attain but small size and are never attacked by insects. Fruiting specimens from the countries where the species is indigenous are not common in collections, and I have not been able to obtain many receptacles from such for dissection; but the few which I have succeeded in getting all contained 3-androus male and gall flowers. I have met no receptacle containing fertile female flowers.

PLATE 158.—*F. pumila*, Linn. A: fruiting-branch with a mature receptacle. B: barren branch. 1, apex of a receptacle; 2, vertical section showing arrangement of the flowers; 3, stipules—*of natural size;* 4, group of male flowers; 5, single male flower with the stamens separated; 6, vertical section of 2-androus male flower, showing the natural position of the stamens and perianth leaves; 7, undeveloped gall flower (*the above are all from specimens grown in Calcutta*); 8, male flower, and 9, gall flower—*from Japanese specimens: all enlarged.*

145. FICUS THWAITESII, *Miq. in Ann. Mus. Lugd. Bat.* iii. 229, 294.—*F. disticha*, Thw. (non Blume) Enum. Pl. Ceylon, 266.—*F. diversiformis*, Miq. in Lond. Journ. Bot. vii. 441; Ann. Mus. Lugd. Bat. iii. 281, 294; Thwaites' Enum. Pl. Ceylon, 266.—*F. stipulata*, Moon (not of Thunbg.) Cat. Ceylon Plants, p. 74.

A shrub, with slender, creeping, root-emitting stem, and stout, spreading, sub-glabrous, non-rooting branches on which the receptacles are borne; the stem, when young, thinly clothed with brown, rather soft, pubescence; its leaves shortly petiolate, sub-coriaceous, polymorphous, from elliptic or ovate to 3-lobed and almost hastate; the apex in all forms obtuse, and the base emarginate or cordate, boldly 3-nerved, and often with 2 subsidiary nerves; the under surfaces pale, with distinct, open, tesselate reticulations, pubescent on the midrib and nerves; upper surfaces adpressed-pubescent, sub-scabrid; length of blade ·5 in. to ·75 in. (according to Miquel to 1·5 in.) long; petioles about ·1 in.; stipules 2 to each leaf, ovate-acuminate, scarious, sparsely pubescent, a little longer than the petiole. Leaves of the receptacle-bearing branches twice as large as those of the stem and its barren branches; elliptic or obovate, never lobed or hastate. Receptacles axillary, usually solitary, smooth, globular, about ·35 in. in diam., contracted at the base into a thin stalk about ·1 in. long, at the junction of which with the peduncle proper are 3 broadly ovate basal bracts; length of peduncle proper about ·5 in. Male, gall, and fertile female flowers mixed over all parts of the same receptacle; the perianths of all of 2 or 3 short, broad, obovate, loosely-attached pieces. Male flowers with 2 anthers which much exceed the perianth in length, without rudiments of a pistil. Gall and fertile female flowers nearly alike, the achenes of both being obliquely ovoid and shining, the gall achene having several prominent cellular rugæ.

Ceylon, from 2,000 up to 5,000 ft., climbing over rocks and trunks of trees. Very common.

The leaves of the receptacle-bearing branches are very unlike those of the creeping stem and its barren branches; and specimens of the two having been distributed separately, they have received different names. Specimens of the fertile branches were originally distributed by the late Dr. Thwaites as C. P. Nos. 2224 and 3116 under the name *F. disticha*, Bl. Miquel, finding that these did not agree with Blume's type, described and named them *F. Thwaitesii*. Specimens of the stem and barren shoots in Hermann's *Herbarium*, i. 21, are, as my friend Dr. H. Trimen informs me, the *planta dubia oxycoccoides* of Linnæus (*Fl. Zeylan.* No. 438). Similar specimens were issued by Thwaites as C. P. 2217, and these were described by Miquel as *F. diversiformis*. But this name, although published earlier than *F. Thwaitesii*, must fall to the ground, as the description accompanying it necessarily contains no account of the receptacles.

Plate 159B.—*F. Thwaitesii*, Miq. *a*, stem and barren branches; *b*, fertile branch—*of natural size.* 1, male flower; 2 & 3, fertile female flowers; 4, gall flower: *enlarged.*

146. Ficus vaccinioides, *Hemsley and King.*

A small creeping shrub, rooting from the stem and larger branches; the young branches puberulous. Leaves shortly petiolate, coriaceous, elliptic or obovate-elliptic, with broad, rounded, rarely sub-acute, apices; entire edges and rounded or sub-emarginate, 3-nerved bases; primary lateral nerves 3 to 4 pairs, rather broad and prominent beneath; lower surface with wide, sub-tesselate reticulations, minutely punctate, puberulous when young; upper surface sparsely adpressed-hispid; length of blade ·4 to ·5 in.; petioles adpressed-pubescent, about ·1 in. long; stipules 2 to each leaf, ovate-acute, scarious, puberulous, twice as long as the petiole, deciduous. Receptacles almost sessile, solitary, axillary, ovoid, from ·15 to ·2 in. across; the umbilical scales large, puberulous; basal bracts 3, ovate-acute, nearly glabrous. Fertile female flowers occupying the whole receptacle, sub-sessile; the perianth of 5 narrow, distinct pieces; achene ovoid-reniform, minutely papillose; style elongate when young; stigma slightly dilated. Male and gall flowers not known.

Formosa,—*Oldham*, No. 535.

A curious and beautiful little species which Maximowicz, who had seen no fruiting specimens, doubtfully refers (*Bull. Acad. St. Petersb.* xi. 341) to *F. impressa*, Champ. (which = *foveolata*, Wall, var. in my opinion). It is closely allied to *F. Thwaitesii*, Miq., a Ceylon plant; also more distantly to *F. disticha*, Bl.

Plate 159A.—Stem and branches of *F. vaccinioides*, Hems. and King, with mature receptacles—*of natural size.* 1, base of receptacle; 2, apex of the same; 3, a stipule; 4, fertile female flower (*young*); 5, achene (*mature*): *enlarged.*

147. Ficus disticha, *Bl. Bijd.* 458; *Miq. in Lond. Journ. Bot.* vii. 440; *Fl. Ind. Bat.* i. pt. 2. 316. tab. 22. fig. B; *Miq. in Ann. Mus. Lugd. Bat.* iii. 294. —*F. elliptica*, Miq. in Lond. Journ. Bot. vii. 440.

A scandent shrub; the young shoots minutely pubescent, but ultimately all parts glabrous. The leaves coriaceous, petiolate, broadly obovate, cuneate-obovate, or elliptic; the apex rounded, sometimes minutely retuse; the edges entire, sub-revolute; the base cuneate, 3-nerved; lateral primary nerves 2 to 4 pairs, and like the midrib and secondary nerves very distinct and pale-coloured on the lower surface which is tesselate-reticulate and glabrous; upper surface uniformly pale, glabrous; length of blade ·8 in. to 2·25 in.; petioles ·25 in. to ·4 in. long; stipules ovate-lanceolate, about ·15 in. long. Receptacles pedunculate, in pairs, or solitary by abortion, from the axils of the leaves or of the scars of fallen leaves, pyriform, with rather prominent umbilicus, constricted at the base into a thin stalk ·1-in. to ·2-in. long at the junction of which with the peduncle proper are 3 small bracts; when ripe glabrous and from ·25 in. to ·4 in. across; peduncle proper ·1 in. long. Male flowers very few and found only under the scales of the mouth of the receptacles containing gall flowers; the perianth of 3 or 4 broad, distinct pieces; stamens 2. Gall flowers with stipitate, ovoid, smooth ovary; the style lateral, more than half as long as the ovary; stigma dilated. Fertile female flowers in separate receptacles, sessile or sub.-sessile; the perianth of about 3 rather broad, distinct pieces; achene elongate, ovoid; style terminal, thick; stigma dilated.

Java and Sumatra, at elevations of from 2,500 to 6,000 ft. Philippines (*Cuming*, No. 1927).

In the texture and venation of the leaves this approaches *F. gibbosa*, Bl., but in other respects it is quite distinct. This has rather a wide distribution, and therefore it varies considerably. Miquel l.c. figures 2, but describes 2 to 5 stamens.

PLATE 160.—A: *F. disticha*, Bl. Fruiting stem and branches with immature receptacles. B: form with larger leaves. 1, mature receptacle; 2, apex of the same; 3 basal bracts—*of natural size;* 4, diandrous male flower; 5, gall flower—*from the same receptacle;* 6, fertile female flower: *enlarged.*

148. FICUS EXCAVATA, *nov. spec.*

A scandent shrub; the young branches covered with tawny pubescence. Leaves petiolate, sub-coriaceous, obliquely ovate or ovate-rotund; the apex rather blunt; the edges entire; base broad, often rather oblique, 5-nerved; primary lateral nerves about 2 pairs and, like the midrib, prominent on the under surface which is sparsely sub-adpressed pubescent, with strongly-marked, open, lacunose reticulations; upper surface glabrous, except the midrib and nerves which are puberulous; length of blade 1·25 to 1·5 in.; petioles ·2 in. long, pubescent; stipules 2 to each leaf, ovate-acuminate, ·25 in. long, sericeous externally, deciduous. Receptacles sessile, in clusters of 6 in the axils of the leaves, depressed globular, pubescent, orange red when unripe; the umbilicus prominent; basal bracts 3, ovate-triangular, glabrous (ripe receptacles are unknown). Fertile female flowers sub-sessile; the perianth of four distinct oblong pieces; achene oblong, faintly papillose; the style short, sub-terminal. Male and gall flowers not seen,

Borneo,—*Beccari*, Herb. Becc. P. Born. No. 1368.

Perak, Malayan Peninsula,—*King's Collector*, Nos. 5404 and 5985.

This is apparently a very distinct and well-marked species. In the deep areolar excavations on the under surface of the leaves it resembles *F. callicarpa*, Miq.; the receptacles are, however, totally different. In habit and receptacles it approaches *F. recurva*, Bl., and *F. lanata*, Bl. All the receptacles which I have examined were filled with gall flowers, and I have not been able to find a single male, nor have I found a single fertile female. Our knowledge of this plant is therefore very meagre.

PLATE 115B.—Branch of *F. excavata*, King, with immature receptacles. 1, apex of a receptacle; 2, base of the same; 3, stipule—*all of natural size;* 4, fertile female flower: *enlarged.*

149. FICUS LÆVIS, *Bl. Bijd.* 437; *Miq. Ann. Mus. Lugd. Bat.* iii. 278, 293.—*Pogonotrophe lævis*, Miq. Fl. Ind. Bat. i. pt. 2. 330; Miq. in Zoll. Syst. Verz. 99.—*Pogon. Assamica*, Miq. Lond. Journ. Bot. vii. 73.—*F. vagans*, Roxb. Fl. Ind. iii. 537.—*F. emodi*, Herb. Ind. Or. Hook. fil. and T. Thoms. (not of Wall.).—*Pogonotrophe dasyphylla*, Miq. in Lond. Journ. Bot. vii. 74; Ann. Mus. Lugd. Bat. iii. 293; Thwaites C. P. 233.—*F. Ceylanica*, Miq. in Ann. Mus. Lugd. Bat. iii. 293; Lond. Journ. Bot. vii. 75.

A powerful epiphytal climber, occasionally (var. *Assamica*) a small tree; the young parts usually glabrous, but not unfrequently pubescent. Leaves membranous, long-petiolate, rotund-ovate or broadly ovate, rarely ovate-elliptic, narrowing rather suddenly towards the shortly cuspidate apex; margins indistinctly dentate towards the apex or entire; base broad, rounded, or emarginate, occasionally more or less deeply cordate, rarely slightly narrowed and blunt or sub-cuneate, 3- or even 5- to 7-nerved (the minor nerves being small); lateral nerves 3 to 4 pairs, slightly prominent below; intermediate nerves transverse to the former, nearly straight, reticulations minute; lower surface glabrous, puberulous, or even pubescent; upper surface glabrous, often puberulous on the midrib and nerves; length of blade 4 to 7 in.; petioles 1·5 in. to 2·5 in.; stipules ovate-lanceolate, ·3 to ·5 in. long. Receptacles pedunculate, axillary, usually solitary, globular, rarely sub-pyriform, not umbonate at the apex, but with rather a broad umbilicus, smooth or puberulous (tomentose in var. *dasyphylla*); basal bracts 3, small, spreading, ovate-triangular; when ripe greenish-yellow and from ·6 in. to 1 in. across; peduncles slender, glabrous, from ·5 to 1 in. long; interior of receptacle between the flowers densely hispid. Male flowers, occupying the upper part of the receptacle with the galls, sub-sessile or stipitate; the perianth of five linear-lanceolate pieces; stamens 2 or 3, elongate, sub-sagittate at the base. Gall-flowers with perianth as in the males; the achene globular, smooth; the style short, terminal, or sub-terminal; stigma dilated. Fertile female flowers pedicellate; the perianth like that of the males; achene elongated, ovoid; the style terminal, nearly as long as the achene; stigma bifid.

From the lower slopes of the Eastern Himalaya, through the hill ranges of Assam, the Khasi and Chittagong Hills, Burmah, to the Malayan Peninsula and Archipelago, at elevations of from 2,000 to 5,000 ft.

As might be expected in a species with such a wide geographical distribution, there is some diversity of form in this species. The only forms that seem, however, worthy of separation as varieties are the following:—

VAR. 1. DASYPHYLLA. Leaves more or less adpressed-pubescent on the under surface; receptacles and peduncles completely covered with tawny tomentum. —*Pogonotrophe Ceylonica* and *dasyphylla*, Miq., Thwaites, C. P. 233. This variety occurs in Ceylon to the exclusion of the glabrous forms.

VAR. 2. TOMENTOSA. Under surface of leaves tomentose; receptacles tomentose or pubescent; peduncles 1 in. long. Malaya. Not common.

VAR. 3. ASSAMICA. Shrubby; leaves very broad, puberulous, and rather thick in texture; receptacles in pairs, with peduncles nearly 1·5 in. long, stout and divergent. Cachar,—*Keenan;* Dupha Hills,—*Lister. Herb. Ind. Or. Hook. fil. and Thoms. Pogonot. Emodi, Miq.*,—Khasi Hills.

The flowers of all these varieties, as I have satisfied myself by numerous dissections, are alike.

Miquel identifies *F. vagans*, Roxb., with *F. macrocarpa*, Wight Icon 1965; but Roxburgh's manuscript drawing of *F. vagans* in Herb. Calcutta shows *vagans* clearly to be identical with authentic specimens of *F. lœvis*, Bl.; while Wight's figure of *F. macrocarpa* (Icon 1965) shows the fruit to be in fascicles on the stem as in *F. glomerata.*

Plate 161.—*F. lœvis*, Bl. A: branch of a pubescent form with young receptacles. B: form with leaf contracted towards the base. C: mature receptacles. 5, triandrous male flower; 2, 3, & 4, gall flowers (from the same receptacle as the male); 1, fertile female flower (from a different receptacle): *enlarged.*

150. Ficus scandens, *Roxb. Fl. Ind.* iii 536; *Wight Icon* 643; *Miq. Lond. Journ. Bot.* vii. 452; *Ann. Mus. Lugd. Bat.* iii. 281, 294; *Brandis For. Flora* 421; *Kurz For. Flora Brit. Burm.* ii. 455.—*F. fruticosa*, Roxb. Fl. Ind. iii. 533; Wall. Cat. 4501.—*F. crustacea* and *triplinervis*, Wall. Cat. 4533A and B.—*? F. hederacea*, Roxb. Fl. Ind. iii. 538.

A scandent shrub, often rooting from the stem and branches; young leaves pubescent, and the young shoots pubescent or glabrous; ultimately all parts except the receptacles glabrous. Leaves coriaceous, petiolate, broadly ovate or ovate-elliptic, with acute or sub-acute apex, entire edges, and a broad, rounded, or very slightly narrowed, strongly 3-nerved base; lateral primary nerves about 3 pairs, prominent below, depressed on the upper surface; under surface sub-areolar, upper surface minutely rugose, slightly rough to the touch when dry; length of blade 2 to 3·5 in.; petioles ·3 to ·5 in.; stipules ovate-acuminate, ·25 in. long. Receptacles pedunculate, in pairs, or solitary by abortion, axillary, globular, not umbonate but with the umbilicus rather prominent, sometimes constricted at the base into a very short stalk; scabrid-pubescent when young; when ripe scaberulous, from greenish yellow to red in colour, and about ·35 in. across; basal bracts 3, united; peduncles ·3 to ·5 in. long, rather slender. Male flowers near the mouth of the receptacles containing gall flowers, sessile; the perianth of 4 broad pieces; stamens 2, the anthers broadly ovate, sub-sessile; gall flowers pedicellate; the perianth of 4 distinct, lanceolate pieces; the achene obovate, smooth; the style short, thick, sub-terminal; stigma hooked. Fertile female flowers in separate receptacles (and on separate plants), pedicellate; the perianth of 4 linear pieces; achene oblong, smooth, with a broad pale margin; style elongate, infra-apical; stigma sub-capitate.

On Parasnath, in Bengal; on the lower slopes of the Himalayas, from Kumaon to Bhotan; on the Khasi and other hill ranges of Assam; the Chittagong Hill Tracts and Burmah; the Andamans. Climbing on rocks and trees at elevations of from 800 to 2,000 ft.

Roxburgh's species *F. hederacea* and *fruticosa* are known only from his descriptions, and from excellent coloured figures prepared under his own direction and now preserved in the Calcutta Herbarium. These figures agree with each other, as do the descriptions practically. The only differences that I can make out are that while the male flowers of *scandens* and *hederacea* are figured as monandrous, those of *fruticosa* are depicted as diandrous; and that *F. fruticosa* is said to be non-scandent.

Plate 162.—Two branches of *F. scandens*, Roxb., with mature receptacles. 1, apex of a receptacle; 2, base of the same; 3, stipules—*all of natural size;* 4, male flower; 5, gall flower from the same receptacle; 6, fertile female flower (from another receptacle); 7, fertile achene: *all enlarged.*

151. Ficus obtusa, *Hassk. in Cat. Hort. Bot. Bogor.* 1844. 75.—*Pogonotrophe Javana*, Miq. Lond. Journ. Bot. vii. 75; Fl. Ind. Bat. i. pt. 2. 330; Miq. in Ann. Mus. Lugd. Bat. iii. 278, 263.—*F. alnifolia*, Miq. Pl. Jungh. 51; Fl. Ind. Bat. i. pt. 2. 330; Miq. in Ann. Mus. Lugd. Bat. iii. 278, 293. t. X D.—*Pogonotrophe phæopoda*, Miq. Lond. Journ. Bot. vii. 76.; Fl. Ind. Bat. i. pt. 2. 331.—*F. piperifolia*, Miq. Mus. Lugd. Bat. iii. 293.—*Pogonotrophe piperifolia*, Miq. Zoll. Syst. Verz. 93, 99; Miq. Fl. Ind. Bat. i. pt. 2. 330.—*Pogonotrophe Bornensis*, Miq. Fl. Ind. Bat. l.c. 330.—*F. platycaula*, Miq. Fl. Ind. Bat. l.c. 318.

A scandent shrub; the young branches densely covered with soft, short, reddish-brown tomentum or pubescence. Leaves coriaceous or thickly membranous, petiolate, more or less broadly ovate, ovate-elliptic or sub-obovate-elliptic, gradually narrowed upwards to the shortly sub-acuminate, acute, or blunt apex; edges entire, revolute when dry; base broad, rounded, rarely narrowed or cordate or emarginate, 5- to 7-nerved (2 pairs being minute); lateral primary nerves 3 or 4 pairs, prominent; the whole of the lower surface, and especially of the midrib and nerves, softly pubescent or puberulous; intermediate nerves rather distinct and straight; reticulations minute, distinct; upper surface minutely hispid; when young scabrid or scabrous; the midrib and larger nerves shortly hispid even when adult; length of blade 2·25 in. to 5 in.; petioles ·5 to ·6 in. long, tomentose or sub-scabrid, ·4 to 7 in. long; stipules lanceolate, pubescent, or villous externally, ·3 in. long. Receptacles shortly pedunculate, or sub-sessile, in pairs in the axils of the leaves or of leaf-scars, obovate-globose to depressed-globose; the apex faintly umbonate when young; densely covered with minute brown tomentum; when ripe yellowish brown to crimson, glabrescent or glabrous, about ·5 in. across; basal bracts 3, broadly ovate, pubescent; peduncles from ·1 to ·3 in long, stout, densely fulvous-tomentose, often almost absent. Male and gall flowers not seen; perianth of female flowers 5-leaved; ovary elongate, elliptic, style long, filiform; the stigmas of neighbouring flowers united into a thick, umbonate disc; interior of receptacle hispid.

Malayan Peninsula and Archipelago.

The forms named *phæopoda* and *platycaula* by Miquel differ from Hasskarl's type in having the leaves very scabrous above and the receptacles sub-sessile. The old leaves of the form named *Pogonotrophe Javana* by Miq. are rather scabrid on the lower surface between the nerves, and in this respect they resemble those of the form named *Pogon. alnifolia.* The form named *Pog. piperifolia* by Miquel has acute or acuminate leaves, the under surface of which is asperulous, with a few scattered hairs, the midrib and larger nerves being adpressed-pubescent; but in my opinion none of these forms is worth separating even as a variety.

This is a very common plant. I have examined a large number of receptacles, and have invariably found them filled with fertile female flowers. No receptacle that I have seen contains a male or a gall flower. I am therefore driven to the conclusion that this is not itself a species, but the female of a species of which the male plant is as yet unrecognised. The enquiry can be completed only in the field.

PLATE 163.—A: *Ficus obtusa*, Hassk. typical form. B: form with acute leaves. 1, apex of receptacle; 2, lateral view of receptacle; 3, stipules—*all of natural size;* 4, female flower unexpanded; 5 & 6, the same expanded; 7, umbonate disc formed by union of the stigmas of the flowers of one receptacle. *Nos.* 1 *to* 6 *are enlarged.*

152. FICUS ALLUTACEA, *Bl. Bijd.* 457; *Miq. Fl. Ind. Bat.* i. *pt.* 2. 319.

A scandent shrub, with puberulous or glabrescent, minutely-warted, branchlets. Leaves coriaceous, petiolate, elliptic, ovate-elliptic, or elliptic-oblong; apex shortly cuspidate or acute; edges quite entire, often revolute; base rounded or narrowed, very slightly biauriculate, 3-nerved; lateral primary nerves 5 or 6 pairs prominent below as are the midrib and minute reticulations; under surface pale-coloured, minutely tesselate, squamulose (in var. *Teysmanniana* also puberulous); upper surface smooth, shining; both surfaces without hairs, but the under surface sub-scabrid from the reticulations; length of blade 4 to 7 in.; petioles thick, ·8 to 1·2 in. long, scurfy when dry; stipules 2 to each leaf, ovate-lanceolate, puberulous, ·4 in. long. Receptacles long-pedunculate, in fascicles of 3 to 6 from short tubercles on the stem below the leaves, or in pairs and axillary; globose, with a slightly prominent umbilicus; smooth, reddish when ripe, and about ·3 to ·5 in. across; basal bracts 3, united; peduncles slender, glabrous, nearly 1 in. long. Female flowers occupying the whole interior of the receptacle; their stigmas often united to form a compact hollow ball; the perianth of 3 or 4 linear-lanceolate, distinct pieces; the achene obliquely elliptic, minutely papillose, its margins pale; style terminal, pointed; stigma cylindric. Male and gall flowers not seen.

VAR. TEYSMANNIANA. Branches verrucose; leaves pubescent on the lower surface, especially on the reticulations; receptacles axillary.—*F. Teysmanniana*, Miq. l.c. 319.

On Mount Salak in Java, and in Sumatra,—*Teysmann;* Perak, in the Malayan Peninsula, —*King's Collector*, No. 7226. Not common. Cultivated in the Botanical Garden, Buitenzorg.

All the receptacles which I have examined, whether from wild or cultivated plants, contain only fertile female flowers. It is therefore quite possible that this is not itself a species. but merely the female of something else.

PLATE 164.—A: apex of branch of *F. allutacea*, Miq., with leaves and stipules. B: lower part of the same branch with nearly mature receptacles. C: branch of var. *Teysmanniana*, with mature receptacles.

1, apex of a receptacle; 2, base of the same: 3, stipules—*all of natural size;* 4, young female flower; 5, female flower with ripe achene: *enlarged.*

153. FICUS RECURVA, *Bl. Bijd.* 457; *Miq. Fl. Ind. Bat.* i. *pt.* 2. 317; *Suppl.* 175, 432; *Ann. Mus. Lugd. Bat.* iii. 279, 294.—*F. villipes*, Miq. Lond. Journ. Bot. vii. 451.—*F. Spanogheana*, Miq. l.c. and in Fl. Ind. Bat. i. pt. 2. 317.—*F. ribesoides*, Wall. Cat. 4522; Miq. in Ann. Mus. Lugd. Bat. iii. 293.—*F. adnascens*, Wall. Cat. 4578B.—*Pogonotrophe ribesoides*, Miq. in Lond. Journ. Bot. vii. 78.—*F. strigosa*, Bl. Bijd. 441; Miq. Fl. Ind. Bat. i. pt. 2. 318; Miq. in Ann. Mus. Lugd. Bat. iii. 279,

294.—*F. urnigera*, Miq. in Zoll. Syst. Verz. 92, 98; Fl. Ind. Bat. i. pt. 2. 318. t. 19.

A scandent shrub, often rooting from the stem. The young branches deciduously villose or pubescent, or sub-scabrid from minute adpressed deciduous hairs. Leaves sub-coriaceous, shortly petiolate, ovate-elliptic, oblong-elliptic, or lanceolate, more or less narrowed to the bluntish or shortly acuminate apex; edges entire, sometimes slightly recurved; base broad, rounded, sub-truncate or emarginate, sometimes narrowed or slightly cordate, 3- to 5-nerved (2 nerves being minute); lateral nerves 2 to 3 pairs; intermediate nerves and reticulations very distinct; the whole of the lower surface (but especially the midrib, nerves, and reticulations) either covered with short, stiff, brownish hairs, or sparsely pilose, or entirely glabrous, but (even when glabrous) slightly rough from the prominent reticulations; upper surface sub-scabrid from the presence of a few short, rough points, or smooth and glabrous except on the depressed midrib and nerves, which are minutely and sparsely adpressed-pilose, or entirely glabrous everywhere (as in some forms of var. *ribesoides*); length of blade 2·5 in. to 5 in.; petioles ·25 in. to ·5 in. long, stout, adpressed pubescent, or glabrous and sub-scabrid; stipules broadly ovate or lanceolate, glabrescent, about ·25 in. long (in the barren shoots ·4 in. long). Receptacles sessile or shortly pedunculate, in clusters of 4 to 10, on short, many-bracted, villose, tubercles in the axils of the leaves, or single or in pairs and not on tubercles; depressed-globular, constricted towards the base; the apical umbilicus sometimes apert and always surrounded by a smooth annulus; pubescent or glabrescent, becoming glabrous; when ripe yellowish red, sometimes spotted with white, about ·2 in. to ·3 in. across; basal bracts 3, rather large, ovate; peduncle, when present, glabrous, ·15 in. long. Male flowers occupying about the upper half of the receptacles of which the lower half is occupied by gall flowers, diandrous, the anthers large, oblong, sub-sessile, placed face to face, the connective forming a thick vertical ridge along the back; perianth of 4 broad, distinct pieces, which are shorter than the anthers. Gall flowers, shortly pedicellate; the perianth of 4 lanceolate pieces; the achene obliquely ovoid, smooth, with short lateral style. Perfect female flowers with perianth of 4 distinct, lanceolate pieces; the achene sub-obovoid or oblong; the style nearly terminal, short, flat, hyaline.

Malayan Peninsula and Archipelago, up to 1,500 ft. Widely distributed, and correspondingly variable in its character.

Two forms appear worthy of separation as varieties:—

VAR. RIBESOIDES (species Wallich). Leaves lanceolate, sparsely pilose, glabrescent or quite glabrous and shining; receptacles larger than in the type (·3 in. across), in smaller fascicles, and sometimes pedunculate; the peduncles not exceeding ·15 in. length. This variety is common at Singapore and in Perak.—*F. adnascens*, Wall. Cat. No. 4578B falls here.

VAR. URNIGERA. Receptacles flattened and depressed at the apex, and with the umbilical annulus large; basal bracts large; leaves glabrescent, sub-strigose beneath.—*F. urnigera, Miq.*

Miquel, in his final revision of the genus *Ficus*, keeps up *F. strigosa*, Bl., as a species, and reduces to it his own species *urnigera*. But the type specimens of Blume's *strigosa* at Leiden appear to me to differ in no essential particular from the more glabrescent forms of *F. recurva*, Bl. *F. urnigera*, Miq., on the other hand, although agreeing with *recurva* as to leaves, differs from the type in the remarkable urceolate, globose receptacles.

Under the manuscript names *perforata* and *sub-urceolata*, I regret to say I distributed two plants which on subsequent consideration 1 find must be reduced to this species.

PLATE 165.—*F. recurva*, Bl. A: typical form. B and C: leaves and receptacles of var. *ribesoides*. D: leaf and two receptacles of var. *urnigera*. 1, apex of receptacle of typical *recurva*, Bl.; 2, base of the same; 3, stipules; 4, side view of immature receptacle of var. *urnigera*; 5, the same, mature—*all of natural size*; 6, male flower; 7, gall flower; 8, achene of gall flower; 9, 10, & 11, fertile female flowers: *enlarged*.

154. FICUS FOVEOLATA, *Wall. Cat.* 4493A to E; *Miq. in Ann. Mus. Lugd. Bat.* iii. 294; *Brandis For. Flora*, 423.—*F. sp.* Griff. Ic. Pl. As. t. 561. ii.—*F. pubigera*, Wall. Cat. 4518.—*F. ? ludens*, Wall. Cat. 4579 (young shoots only).—*Pogonotrophe reticulata, pubigera, verrucosa, and foveolata*, Miq. Lond. Journ. Bot. vii. 76 & 77.—*F. nipponica*, Fr. and Sav. Enum. Pl. Jap. i. 436; ii. 491; Maxim. in Bull. Acad. St. Petersb, xi. 338.—*F. erecta*, Miq. (non Thunb.) in Ann. Mus. Lugd. Bat. ii. 200; iii. 294.—*F. Thunbergii*, Maxim. in Bull. Acad. St. Petersb. xi. 339.—*F. impressa*, Benth. Fl. Hong-Kong, 328; Miq. in Ann. Mus. Lugd. Bat. iii. 294.—*F. Wrightii*, Benth. l.c. 329.—? *F. Luducca*, Roxb. (*fide* Wall. in Cat. 4493D.)

A scandent shrub. The young branches, the petioles and under surfaces of the leaves, and the young receptacles with their peduncles all more or less pubescent, sometimes sub-floccose, but ultimately glabrous or nearly so. Leaves membranous, petiolate, lanceolate, oblong-lanceolate, ovate, or oblong, occasionally elliptic, with a more or less long, sometimes obliquely-acuminate or acute, apex; edges entire; base rounded, sub-cordate, or slightly narrowed or sub-cuneate, 3-nerved; lateral primary nerves 3 to 6 (rarely 7 or 8) pairs, prominent below, as are also the secondary nerves and fine sub-areolar reticulations; under surface more or less pubescent or sub-floccose, becoming glabrescent, or (in vars. *nipponica* and *impressa*) glabrous from the first; upper surface glabrous; length of blade 1·25 in. to 6 in.; petioles ·2 to ·6 in., like the under surface of the leaves as to pubescence; stipules 2 to each leaf, from ovate-lanceolate to linear, villous externally, nearly ·5 in. long. Receptacles sessile to shortly pedunculate, solitary, axillary, from globular to ovoid or obovoid, more or less umbonate at all stages, and with 3 broadly ovate, acute, often reflexed, basal bracts, always more or less puberulous, and often prominently verrucose or wrinkled; the globular forms, when ripe, measuring ·3 in. to ·6 in. across; the ovoid about 1 in. long and ·75 in. broad, and the obovoid measuring about 1·5 in. either way; peduncles ·1 in. to ·3 in. long. Male flowers in the receptacles with the galls, pedicellate; the perianth of 4 distinct pieces; anthers 2 (3 in some), elongate-ovate, pointed, placed face to face, the short filaments united below. Gall flowers pedicellate; the perianth of 4 free, linear pieces; the ovary obovoid, smooth; style short; stigma dilated. Fertile female flowers with perianth of 4 distinct leaves; achene oblong-reniform, minutely papillose; the style sub-terminal, elongate.

Along the outer ranges of the Himalaya, from Chamba to Bhotan, at elevations of from 2,000 to 7,000 ft.; in the Khasi and Chittagong Hills; in Burmah; also in Japan, and probably in North China; in Hong-Kong. Creeping on rocks or on steep ground, and in the latter case rooting from the branches; also climbing on trees.

This is the most widely-distributed scandent *Ficus* in India, and in Japan also it appears to be very common. It has, moreover, a great altitudinal range, extending in the Himalayan chain from the bottoms of low valleys where the climate is almost tropical, to elevations where snow lies in winter. Individuals with globular receptacles form the majority, and of these three varieties may be distinguished, in all three the receptacles being rather small. Also as very distinct varieties, I separate two forms with large, ovoid, obovoid, or sub-globular, often terminal, receptacles:—

Receptacles globular, small—

VAR. 1. NIPPONICA. Leaves always glabrous, about 3 in. long; receptacles solitary or in pairs, almost sessile, glabrous.—*F. nipponica*, Franch. and Sav ;—Japan.

VAR. 2. IMPRESSA. Leaves pubescent when young, glabrous when adult, from 1·25 in. to 1·75 in. long; receptacles pedunculate, pubescent when ripe.—*F. impressa*, Benth. ;—Hong-Kong.

VAR. 3. THUNBERGII. Adult leaves very pubescent beneath, deeply areolar on the lower surface, from ·75 to 1·25 in. long; receptacles pubescent, when ripe nearly ·5 in. across.—*F. Thunbergii*, Maxim. ;—Japan.

Receptacles ovoid, obovoid, or sub-globular, large—

VAR. OLEÆFORMIS. Creeping on the ground or on rocks, never on trees; receptacles ovoid, 1 in. long; leaves oblong-lanceolate; anthers much longer than perianth of male flower. In the Sikkim Himalaya, about 4,500 ft.—*King.*

VAR. MALIFORMIS. Climbing to the tops of trees 60 to 80 ft. high, and fruiting only near the apex; receptacles obovoid, sub-globose, much umbonate, from 1·5 to 2 in. in diameter; leaves broadly ovate-lanceolate; anthers much longer than perianth. Sikkim; Khasi.

The varieties with large receptacles have been confounded by Miquel and others with *F. erecta*, Thunb., with which they have really no affinity. They have also been mixed up with *F. pumila*, Linn. As in the case of *F. pumila*, much light is thrown on the synonymy of this species by Maximowicz in his paper in the eleventh volume of the Bulletin of the St. Petersburg Academy. In that paper the species *Nipponica* and *Thunbergii* are founded on specimens which, on comparison with Wallich's type specimens of *foveolata*, I cannot find to differ even in the details of the flowers.

The name *foveolata*, Wall., is not mentioned by Maximowicz, from which I gather that specimens of it are not present in the St. Petersburg herbarium. Wallich's type specimens of his species *pubigera* are simply *foveolata* with the leaves sub-flocculent on the lower surface. *Pogonot. verrucosa*, Miq., is simply this with warted receptacles. Barren branches of this species, with leaves varying a good deal in shape, are numerous in collections from the Himalaya; and specimens of this kind were issued by Wallich as No. 4579 of his distribution under the name *F. ludens*, Wall.

I think it probable that Roxburgh's species *Luducca*, of which he gives a very imperfect description (*Fl. Indica*, iii. 534), falls here, and sheet D of *Wall. Cat.* 4493 bears that name in a handwriting which I believe to be Roxburgh's. Were it absolutely certain that this is *Luducca*, Roxb., that name, being the earliest published, would stand.

PLATE 166.—*F. foveolata*, Wall. Four twigs with leaves and mature receptacles to illustrate the forms on which four species were founded. A = *foveolata*, Wall.; B = *pubigera*, Wall.; C = *reticulata*, Miq.; D = *verrucosa*, Miq. 1,1,1, apex of a receptacle; 2,2,2, base of the same; 3,3,3, stipules;—*all of natural size;* 4, a male flower; 5, the same, opened to show the two anthers; 6, male flower from the variety *oleæformis*; 7, gall flower, young; 8, the same, farther advanced; 9 & 10, fertile female flowers: *all enlarged.*

PLATE 167.—*F. foveolata*, Wall. Fruiting branches of three varieties:—E: var. 1, *Nipponica*; F: var. 2, *impressa*; G: var. 3, *Thunbergii*—*all of natural size.* Apex and base of a receptacle and stipules of each variety are also shown: *all of natural size.*

PLATE 168.—*F. foveolata*, Wall. Fruiting branches of two varieties:—H: var. 4, *oleæformis*; I: var. 5, *maliformis*: *of natural size.* 1, male flower *in situ* with receptacular hairs at its base; 2, male flower showing the 2 stamens and minute perianth; 3, female flower *Nos.* 1 *to* 3 *are enlarged.*

155. FICUS RAMENTACEA, *Roxb. Fl. Ind.* iii. 547; *Kurz For. Flora Brit. Burmah* ii. 454.—*Pogonotrophe rigida*, Miq. in Lond. Journ. Bot. vii. 74; Miq. Fl. Ind. Bat. i. pt. 2. 331.—*F. rigescens*, Miq. Ann. Mus. Lugd. Bat. iii. 293.—*F. vagans*, Wall. (not of Roxb.) 4562.—*F. sub-rigida*, Miq. Fl. Ind. Bat. Suppl. 175, 433.—? *F. leptocarpa*, Steud. Nomencl. 636.—*F. microcarpa*, Bl. Bijd. 442.—*F. adhærens*, Miq. Pl. Jungh. 55; Fl. Ind. Bat. i. pt. 2. 319. t. 22; Miq. in Ann. Mus. Lugd. Bat. iii. 280, 294.—*F. oligosperma*, Miq. Pl. Jungh. 55; Fl. Ind. Bat. i. pt. 2. 319.

A powerful epiphytic climber, often becoming an independent tree; the young branches puberulous, very soon becoming glabrous. Leaves rather shortly petiolate, coriaceous, ovate to ovate-elliptic; apex acute or shortly sub-acuminate; edges entire, waved, and sometimes slightly revolute; base cordate, emarginate, or rounded, 3- to 5-, rarely 7-nerved (2 being minute); lateral primary nerves 5 or 6 pairs, prominent on the under surface; intermediate nerves nearly parallel to each other; reticulations sub-areolar, minute; under surface glabrous, slightly rough from the sub-areolate reticulations; puberulous on the midrib and nerves when young; upper surface pale when dry, glabrous; length of blade from 2·5 to 8, and in young shoots even 11 in.; petioles stout, ·75 in. to 1·3 in. long, minutely puberulous when young, afterwards glabrous; stipules ovate-lanceolate, villous or pubescent externally, ·5 in. long, very deciduous. Receptacles shortly pedunculate (sessile in var. *adhærens*), axillary, in pairs or solitary, occasionally in fascicles from minutely bracteate, villous tubercles in the axils of the leaves, or from the stem below the leaves; depressed-globular, abruptly contracted at the base into a cylindrical stalk, at the junction of which with the short pedicel are 3 small, reflexed, glabrous bracts; slightly umbonate at the apex; sparsely hairy when young, but glabrous when ripe; orange or orange-red in colour, and from ·2 in. to ·5 in. across; peduncle proper (below the stalk-like constriction of the receptacle) only about ·1 in. long. Male and gall flowers with similar perianth of 3 narrow pieces; anthers 2, much elongate, narrow, on short filaments; gall ovary obovoid, smooth; the style short, lateral. Perianth of fertile female flower of 3 pieces, united below; achene elliptic; style elongate, lateral; stigma cylindric.

As a constant form may be separated off

VAR. ADHÆRENS—with the leaves smaller than the type, and the receptacles sessile.—*Pogon. adhærens, Miq.*

Eastern Himalaya, Chittagong, Burmah, Malayan Peninsula and Archipelago, up to elevations of 2,500 ft.

Widely diffused and variable as to size, but pretty constant in other characters. I have no doubt, after examining the type specimens in the Leiden herbarium, that Miquel's *Pogonotrophe rigida* (of which his published description is very meagre) is the same as the plant named *F. ramentacea* by Roxburgh, of which an excellent coloured drawing (prepared under Roxburgh's supervision) exists in the Calcutta herbarium. I believe this to have been also the late Mr. Kurz's opinion, although he did not publish it; his *Forest Flora of Burmah* unfortunately giving no synonyms. The plant named *adhærens* by Miquel has the receptacles not constricted into stalks at the base. It is the same as *F. microcarpa* of Blume; but the name *microcarpa* having been pre-occupied, Steudel altered it to *leptocarpa*, publishing, however, no description.

PLATE 169.—*F. ramentacea* Roxb. Two branches with nearly mature receptacles. 1, mature receptacles: 2, fascicle of mature receptacles; 3, apex of receptacle; 4, base of ditto; 5, stipules—*all of natural size ;* 6, male flower with 2 stamens and perianth of 3 pieces; 7, gall flower from the same receptacle; 8, achene of perfect female flower; 9, perfect female flower with a perianth from another receptacle. *Nos.* 6 *to* 8 *are enlarged.*

N.B.—*Figs.* 1 *and* 2 *at the lower left-hand corner have been printed by mistake and are to be deleted.*

156. FICUS ARANEOSA, *nov. spec.*

Scandent. The young branches, petioles, and under surface of the leaves, the receptacles and their peduncles, densely covered with soft grey, araneoid tomentum. Leaves thinly coriaceous, shortly petiolate, narrowly ovate or ovate-lanceolate; their apices shortly and bluntly cuspidate; edges entire; base rounded or sub-cuneate, 3-nerved; the lower surface densely covered with flocculent, pale grey tomentum; upper surface glabrous; length of blade 2·5 to 3·5 inches; petiole ·35 in. to ·75 in. long; stipules ovate, convolute, flocculent externally, glabrous internally, ·25 in. long. Receptacles shortly pedunculate, axillary, in pairs or in fascicles of 3 to 7; when young pyriform, with a prominent umbilicus; base ebracteate, densely flocculent (ripe fruit unknown); peduncles flocculent like the receptacles, about ·1 in. long, with several small, glabrous bracts at their bases. Male flowers (occupying the upper part of the same receptacles as the gall flowers, sessile, the perianth of 4 broad, distinct pieces; stamens 2; the anthers narrow, elongate, sagittate at the base. Gall flowers with perianth of 4 very broad pieces; the ovary obliquely and narrowly ovoid; the style short, terminal. Fertile female flowers with perianth of 4 broad, blunt pieces; young achene with a sub-terminal, rather short, thick style; ripe achene unknown.

Malayan Peninsula; at Laroot, in the province of Perak. Collected by Mr. H. H. Kunstler.—*King's Collector,* Nos. 3565 and 6038. At once recognisable by its flocculent, araneoid clothing.

PLATE 170.—Fruiting-branch of *F. araneosa,* King, with immature receptacles. 1, side view of a young receptacle; 2, apex of the same; 3, bracts of base of peduncle; 4, stipule—

all of natural size; 5, male flower; 6, gall flower—*unopened;* 7, ovary of gall flower; 8, perianth of fertile female flower; 9, achene (young) of fertile female flower: *enlarged.*

157. FICUS LANATA, *Bl. Bijd.* 441; *Miq. Fl. Ind. Bat.* ii. *pt.* 2. 317; *Miq. in Ann. Mus. Lugd. Bat.* iii. 294.

A scandent shrub. The young branches, petioles, and under surface of the leaves softly fulvous-villose. Leaves coriaceous, rather long-petiolate, lanceolate, rarely ovate-lanceolate, acuminate, with entire edges which are revolute towards the rounded, emarginate, or rarely slightly cordate, 3 nerved base; lateral primary nerves 3 or 4 pairs, prominent below, depressed above; intermediate nerves transverse; lower surface with numerous small, dark tubercles and densely covered with long, soft, fulvous hairs; upper surface sub-rugose, glabrous, except the midrib and larger nerves which are tuberculate and minutely, but deciduously, hispid; length of blade 2·5 to 4 in.; petioles ·6 to 1·2 in. long; deciduously villose, scabrid; stipules ovate-lanceolate, glabrous internally, villous externally, about ·5 in. long, very deciduous. Receptacles pedunculate, in pairs or fascicles from bracteolate, axillary tubercles; depressed-globular, verrucose, and occasionally with a few subulate bracts scattered along their sides, glabrous; basal bracts none; when ripe orange red with white spots, about ·2 in. across; pedicels glabrous, from ·1 to ·25 in. long. Male, gall, and fertile female flowers as in *recurva*, Bl.

Java, climbing on trunks of trees at elevations of from 2,500 to 5,000 ft.

Allied to *F. villosa*, Bl., but differing in its proportionately longer petioles and shorter leaves, and in its glabrous, smaller receptacles. This and *F. villosa*, Bl., differ from *F. recurva* in externals only, the flowers of both being the same in structure as those of *F. recurva*, Bl. Both are, I believe, mere varieties of that species, and I keep them distinct only as a matter of convenience.

PLATE 171.—A: branch of *F. lanata*, Blume, with mature receptacles. B: branch of a more shaggy form. C: leaf and receptacles of form with ovate-lanceolate leaves. 1, stipules—*all of natural size;* 2, perianth of male flower; 3, anthers of the same; 4, fertile female flower: *enlarged.*

158. FICUS VILLOSA, *Bl. Bijd.* 441; *Miq. in Lond. Journ. Bot.* vii. 451; *Fl. Ind. Bat.* i. *pt.* 2. 317; *tab.* 21B; *Ann. Mus. Lugd. Bat.* iii. 294.—*F. dives*, Miq. Choix de Plantes de Buitenz. t. 12.—"*F. hirsuta, Wall.*," Miq. Fl. Ind. Bat. i. pt. 2. tab. 21A.—*F. obtecta*, Wall. Cat. 4505.—? *F. barbata*, Wall. Cat. 4576.

A scandent shrub. The young branches, receptacles, peduncles, petioles and under surface of the leaves fulvous-villose. Leaves coriaceous, petiolate, oblong-ovate or ovate-lanceolate, acuminate, with entire, recurved edges, and rounded, emarginate, or slightly cordate, 3- to 5-nerved base; lateral primary nerves about 5 or 6 pairs, prominent below, depressed above; intermediate nerves transverse; lower surface densely fulvous-villose; upper surface sub-rugose or smooth, except the midrib and nerves which are minutely hirsute; length 5 to 7·5 in.; petioles ·5 to 1 in., villous; stipules, 2 from base of each leaf, large, broadly oblong-lanceolate, glabrous, from ·75 to 1·75 in. long., caducous. Receptacles shortly pedunculate, in fascicles, from short axillary tubercles, ovoid, umbonate, villous, without basal bracts; when ripe orange yellow and about ·3 in. across; peduncles from ·1 to ·5 in. long., villous, minutely bracteolate. Male, gall, and fertile female flowers with perianth of 4 lanceolate, elongate pieces; anthers narrow, elongate, with short filaments; gall ovary narrowly ellipsoid; style short, thick, sub terminal; achene of fertile female flowers ellipsoid, style lateral, stigmas usually agglutinated to form an umbonate disc.

Malayan Peninsula and Archipelago, up to elevations of 2,000 ft.

This plant comes very near to *F. lanata*, Bl., and both are in my opinion forms of *recurva*, Bl. *F. hirsuta*, Wall., is quoted by Miquel as a synonym of *F. villosa*, Bl. (No. 290 in *Ann. Mus. Lugd. Bat.* 294), but I can find no trace of a *F. hirsuta* in *Wall. Cat.* The name *F. hirsuta*, Wall., is also given by the same author as a synonym under *F. villosa*, Bl. (*Fl. Ind. Bat.* i. pt. 2. 317), and a figure is given of it under tab. 21A, but no Wallichian number is quoted. The figure agrees with the figure of *F. villosa*, Bl. B. (on the same plate), with the exception that the receptacles are pedunculate, whereas in the figure of *villosa* they are sessile.

Plate 172.—*F. villosa*, Bl. A: branch showing leaves, the deciduous stipules at the bases of the leaves, and young receptacles. 1, under surface of half a leaf (the longer hairs removed to show the reticulations); 2, twig showing fascicles of young receptacles; 3, a fascicle of receptacles, nearly mature; 4, side view of a receptacle; 5, the 3 bracts on the peduncle; 6, apex of a receptacle; 7, stipules from the apex of a branch—*all of natural size;* 8, fertile female flower—*unexpanded;* 10, the same expanded; 11, male flower with 2 anthers; 9, gall flower: *all enlarged.*

159. Ficus crininervia, *Miq. Fl. Ind. Bat. Suppl.* 175, 432.—*F. lanigera*, Wall. Cat 4577.—*F. grossinervis*, Miq. MSS. in Herb. Lond. and Utr.

A scandent shrub, rooting from the stem and branches. The young branches, petioles and nerves on the lower surface of the leaves covered with long, tawny, coarse, silky, deciduous hairs. Leaves petiolate, coriaceous, ovate-elliptic or ovate-oblong; the apex acuminate or shortly cuspidate; edges entire and slightly revolute; base deeply cordate or sub-sagittate, palmately 5- to 7-nerved; lateral primary nerves 5 or 6 pairs; intermediate nerves parallel, slightly curved, rather prominent; the under surface tesselate-reticulate; the midribs and nerves of adult leaves often with fine silky hairs; upper surface covered with very minute, deciduous scales, otherwise glabrous; length of blade 5 to 10 in.; petioles rather stout, deciduously hirsute, scurfy, from ·5 to 1·25 in. long; stipules especially prominent on the barren branchlets, 2 to each leaf, linear-lanceolate, flaccid, almost glabrous, ·7 to 1·3 in. long. Receptacles shortly pedunculate, solitary, or in pairs, axillary, obovate-globose, contracted towards the base and without basal bracts; apex slightly umbonate, deciduously hairy, becoming smooth, about ·3 or ·4 in. across; peduncles ·2 to ·3 in long, bracteate at the base. Male flowers unknown Fertile female flowers sub-sessile, or on long, thin pedicels; the perianth of 4 distinct pieces, which completely envelope all parts of the young pistil except the stigma; young achene obliquely ovoid; the style short, sub-terminal; stigma large, lanceolate; ripe achene, male and gall flowers unknown.

Assam, Chittagong Hill Tracts, Malayan Peninsula, and Archipelago; (probably also in Burmah); Mount Arfak in new Guinea,—*Beccari* (P. P. 951).

This apparently does not fruit freely, for the majority of the specimens met with in collections consist of leaves only.

Plate 173.—*F. crininervia*, Miq. The point of a young shoot with leaves and stipules. B: adult leaf and mature receptacles. 1, apex of receptacle; 2, base of ditto; 3, stipules—

all of natural size; 4, unexpanded fertile female flower; 5, achene (young) from a sub-sessile flower; 6, achene (young) from a pedicellate flower.

Erect Shrubs or Trees.

160. FICUS DIVERSIFOLIA, *Bl. Bijd.* 456; *Miq. in Ann. Mus. Lugd. Bat.* iii. 268, 288; *Miq.* (*sub Synœcia*) *in Lond. Journ. Bot.* vii. 470. *tab.* 9. *fig.* B.; *Fl. Ind. Bat.* i. *pt.* 2. 328; *Miq. Pl. Jungh.* 67.—*F. spathulata*, Miq. Lond. Journ. Bot. vii. 441 (excl. syn. *F. retusa*, Herb. Madr. Wall. Cat. 4530).—*F. deltoidea*, Jack Malay. Miscell. vii. 71.—*F. ovoidea*, Jack Malay. Miscell. vii. 71; Wall. Cat. 4526.—*F. sideroxylifolia*, Griff. Notulæ Pl. Dicot iv. 389. t. 551. fig. 2.—*F. lutescens*, Desf. H. P. ed. iii. 413.—*Erythrogyne frutescens*, Visian. apud Gaspar. Rich. 86; Miq. in Lond. Journ. Bot. vii. 453.

A glabrous shrub or small tree, often epiphytal. The leaves coriaceous or sub-coriaceous, petiolate to nearly sessile, minutely tuberculate beneath, for the most part deltoid or cuneate-obovate, much narrowed and glandular at the base; the apex broad, blunt, sometimes oblique, rounded, or truncate, occasionally unequally emarginate to bifid; the midrib bifurcating once or oftener, with a dark-coloured gland in one or more of the lower bifurcations, the edges entire; or (but not often on the same plant) elongate, narrowly obovate, oblanceolate, oblong-lanceolate, or sub-rhomboidal; the apex blunt, rounded, or acute, with pinnate venation, and with glands in the axils of 2 or 3 of the lower lateral nerves; length of blade 1 in. to (in var. *Kunstleri*) 5 in.; breadth from ·75 in. to (in var. *Kunstleri*) 4 in.; petioles from ·2 in. to ·4 in. long (1·5 in. to 3 in. long in var. *Kunstleri*); stipules linear-lanceolate, convolute, from ·3 in. to ·6 in. long. Receptacles axillary, solitary, or in pairs; pedunculate, depressed-globose to ovoid or pyriform, strongly unbonate at the apex, of a dull yellow or reddish colour and smooth when ripe, from ·2 in. to ·35 in. across; basal bracts 3, short, broad, spreading, puberulous; peduncle from ·2 in. to 1 in. long. Male flowers occupying the upper half of the same receptacles as the galls, pedicellate; the perianth of 4 obovate, rather irregular pieces; the stamens 2, lying face to face, longer than the perianth. Gall flowers sessile or pedicellate; the perianth of 3 elongated and linear-lanceolate, or short, ovate, rather fleshy pieces; the ovary globular and smooth or angular, rough, and crustaceous in texture; the style short sub-terminal; the stigma wide, tubular. Fertile female flowers occupying separate receptacles; the ripe achene twice as large as the gall achene, elongated-reniform, shining; the style lateral, elongate; the stigma with 2 long, narrow arms; perianth of several small, fleshy ovate-lanceolate, fleshy, free pieces.

Malayan Peninsula and islands.

A widely-distributed and therefore a variable species; usually epiphytal, but often growing on the ground. The majority of the individuals have leaves of the obovate-cuneate type, with bifurcating midrib; and it is not often that one is met with having also elongated, oblanceolate leaves with pinnate nervation. The occurrence of such dimorphous individuals was, no doubt, the occasion of Blume's specific name *diversifolia*. Blume's name was not published until 1825, while Jack's two names, *deltoidea* and *ovoidea*, were published in 1822. I retain Blume's name for the species in preference to either of Jack's, because Blume's description recognises the dimorphousness of the plant, and covers the two forms which Jack raised to specific rank. An admirable account of the various forms assumed by this species, and of the structure of its flowers, has been given by Count Solms Laubach in the volume of *Botanische Zeitung* for 1885 (pp. 518 *et seq.*).

Three varieties may be distinguished:—

VAR. 1. OVOIDEA. All parts smaller than in the typical form. Leaves narrow, obovate to oblanceolate; the apex entire, rounded. Receptacles sub-globular or ovoid, usually in pairs, ·25 in. long.—*F. ovoidea*, Jack.

VAR. KUNSTLERI. Leaves large, cuneate-deltoid; the apices rounded or emarginate; the petioles 1·5 in. to 3 in. long. Receptacles about ·6 in long. Male flowers on very long pedicels, the perianth very small; perianth of gall of three linear pieces, which are much longer than the achene. Perak,—Kunstler (*King's Collector*, Nos. 723 and 4776).

VAR. LUTESCENS. Leaves with pinnate nervation, sub-rhomboidal, acute at base and apex.—*F. lutescens*, Desf. On the ground and epiphytal, at elevations of from 4,000 to 5,000 ft. in Java, Perak.

PLATE 174.—*F. diversifolia*, Bl. (A) fruiting-twig of form with forking midrib and cuneate, rounded leaves; (B) fruiting-twig with cuneate-truncate leaves; (C) fruiting-twig with pinnate nervation; (D) fruiting-twig of var. *ovoidea*; (E) fruiting-twig, of a form intermediate between C and D—*all of natural size.* 1 & 2, base and apex of receptacle; 3, stipules; 4, male flower—*unexpanded*; 5, the same—*expanded*; 6, sessile and 7, pedicellate gall flowers, of ordinary form; 8, the same with angled, crustaceous pericarp; 9, fertile female flower from (C). *Nos. 4 to 9 are enlarged.*

PLATE 175.—*F. diversifolia*, Bl. (A) & (B). var. *Kunstleri—of natural size*. 1 male flower: 2, gall flower: *much enlarged.* (C) var. *lutescens—of natural size.* 3, fertile female flower; 4, scale from interior of receptacle, (? piece of perianth of 3): *much enlarged.*

161. FICUS OLIGONEURA, *Miq. Ann. Mus. Lugd. Bat.* iii. 288.—*Urostig. oligoneura*, Miq. Fl. Ind. Bat. Supp. 438 —*Synœcia grandifolia*, Kurz in Nat. Tijdschr. Ned. Ind. vol. 27. 184.

A small glabrous tree. Leaves short-petiolate, coriaceous, often unequal, varying in shape from ovate-elliptic, sub-rhomboidal, or sub-obovate, to sub-rotund; their apices acute, obtuse, or broad and rounded; their bases acute or sub-acute, bi-glandular and 3-nerved; the edges entire, slightly undulate, and sub-revolute; penni-nerved; the midrib sometimes bifurcate; primary lateral nerves 4 or 5 pairs, prominent and pale-coloured on the lower surface; reticulations rather wide and prominent; length of blade 3 to 5 inches; petioles ·3 to ·4 in. long, stout; stipules linear-lanceolate, about ·4 in. long. Receptacles solitary, axillary, shortly pedunculate, depressed-globose to ovoid; the apex umbonate when ripe; glabrous, dotted, about ·5 in. or ·6 in. across; basal bracts 3; broadly ovate, membranous, ciliate. Male flowers numerous in the upper part of the receptacles with the gall flowers; the structure of both as in *F. diversifolia*, except that the pieces of the perianth of the male flowers are broader and have blunt apices. Fertile female flowers not seen.

Sumatra,—*Teysmann.*

This is a very little-known species, and specimens of it occur in few collections. Miquel originally included it in the sub-genus *Urostigma*, but it is clearly no *Urostigma*. Its affinities are with *F. diversifolia*, Bl., of which it may really only be an extreme form. Kurz describes the ripe receptacles as yellow spotted with white.

PLATE 176.—*F. oligonevra*, Miq. Twigs with immature and mature receptacles and with differently shaped leaves—*of natural size.*

162. FICUS PANDURATA, *Hance in Ann. Sc. Nat.* 4. *ser.* xviii. 229; *Maxim. in Bull. Acad. St. Petersb.* xi. 345.

A low, diffuse bush. The young branches deciduously hispid-pilose, ultimately glabrous. Leaves petiolate, membranous, panduriform; the apex shortly cuspidate; the base acute, 3-nerved; primary lateral nerves 5 or 6 pairs, the lower almost horizontal, the upper oblique, all prominent, and, like the midrib, sparsely adpressed-hispid below; the rest of the lower surface minutely tuberculate and scaberulous; the upper surface glabrous; length of blade about 2 5 in.; breadth at the broadest part 1·25 in. to 1·5 in.; petiole ·25 in. long. Receptacles axillary, solitary, or in pairs, pedunculate, ellipsoid or sub-obovate, with prominent umbilical bracts; smooth when ripe, and about ·2 in. across; basal bracts 3, broadly ovate; peduncle ·25 in. long. Fertile female flowers sessile; the perianth of 3 or 4 distinct pieces; style lateral, elongate; stigma oblique. Male flowers not seen.

Southern China, Whampoa,—*Dr. Hance;* near Canton,—*Mr. P. Sampson.*

There are specimens of this at Kew collected and named by Dr. Hance. The species comes near to *F. Formosana*, Maxim. I have not seen any receptacles containing male or gall flowers, and neither Hance nor Maximowicz describes the males.

PLATE 177B.—Fruiting-branch of *F. pandurata*, Hance, with young receptacles—*of natural size.* 1, young female flower; 2, young fertile achene: *enlarged;* 3, apex of receptacle; 4, base of the same; 5, stipules: *of natural size.*

163. FICUS ERECTA, *Thunbg.* (*non alior.*) *Dissert. Ficus* 9, 15; *Thunbg. in Transac-Linn. Soc.* ii. 327; *Bank's Kaempf. Icones Sel. t.* 4; *Sieb. Syn. Pl. Oecon. No.* 173; *Fr. and Savat. En. Pl. Jap.* i. 435. ii. 490; *Itabu, Kaempf. Amoen. Exot.* 803.—*F. pumila*, Thunb. Fl. Jap. 33.—?*F. pyrifolia.* Burm. Fl. Ind. 226; Miq. Prol. 131.--?*F. Japonica*, Bl. Bijd. 440; Sieb., Zucc. Fl. Jap. Fam. Nat. n. 778; Maxim. in Bull. Acad. St. Petersb. xi. 328.—*F. Beecheyana*, Hook. and Arn. Beechey's Voyage 271; Miq. in Lond. Journ. Bot. vii. 437; Ann. Mus. Lugd. Bat iii. 294; Benth. Fl. Hong-Kong 329; Maximowicz in Bull. Acad. St Petersb. xi. 329.—*F. Sieboldi*, Miq. Ann. Mus. Lugd. Bat. ii. 199, iii. 295; Maxim. in Bull. Acad. St. Petersb. xi. 327.

A shrub or small tree. The young branches sub-glabrous or (in var. *Beecheyana*) hispid-pilose. Leaves membranous, petiolate, broadly ovate, obovate-elliptic, sometimes sub-rhomboidal, or (in var. *Sieboldi*) elongate-lanceolate; the apices acuminate or cuneate-acuminate; gradually narrowed from about the middle to the truncate, rounded, sub-emarginate or sub-cordate, sometimes slightly unequal, 3- (sub 5) nerved base; lateral primary nerves about 4 pairs (twice as many in var. *Sieboldi*); the lower surface minutely tuberculate, glabrous, or pubescent (almost tomentose in var. *Beecheyana*), especially on the midrib and larger nerves; upper surface glabrous or scabrid, with a few short stiff hairs; length of blade 3·5 to (in var. *Sieboldi*) 6 in.; edges entire, or obscurely serrate in the upper half; stipules ovate-acuminate, glabrous or pubescent externally, ·3 in. long. Receptacles pedunculate, in pairs, axillary, depressed-globose, with a prominent umbilicus, often much constricted at the base and produced into a stalk which equals the peduncle proper in length; glabrous, or puberulous (shortly hispid in var. *Beecheyana*) when young; smooth or nearly so when ripe and about ·5 in. across; basal bracts 3, ovate-triangular; peduncle slender, puberulous, ·5 in. to ·7 in. long. Male flowers in the receptacles with the galls, shortly pedicellate or sub-sessile; the perianth of 3 lanceolate pieces; stamens from 1 to 3. Gall flowers pedicellate; the perianth of 3 pieces; ovary smooth, globular, with short lateral style and dilated stigma. Fertile female flowers sub-sessile; the perianth of 4 distinct pieces; style lateral, thick, stigma bilobed.

China, Japan, and Formosa.

A variable plant, of which two varieties may be distinguished.

VAR. SIEBOLDI. Leaves elongate, lanceolate. Receptacles much constricted at the base. *F. Sieboldi*, Miq.

Japan.

A form of this, with the leaves pilose-hispid on the under surface, but otherwise undistinguishable from Japanese specimens, is found in the Sikkim Himalaya and the Khasi Hills. It is however rare.

VAR. BEECHEYANA. The young branches hispid-pilose. Leaves almost tomentose on the lower surface. Receptacles shortly hispid, not constricted at the base. *F. Beecheyana*, Hook. and Arn.

Formosa, Hong-Kong.

This differs from the typical form only by its hairiness.

Miquel quite misunderstood Thunberg's *F. erecta*, and he confused it with various species, but chiefly with forms of *F. foveolata*, Wall. (See *Ann. Mus. Lugd. Bat.* iii. 294). Maximowicz (*Bullet. de l'Acad. des Science de St. Petersb.* xi. 328) describes the stigma of *F. Sieboldi* as 3-lobed. I cannot, however, find more than two lobes. Receptacles containing fertile female flowers are rare, and I have never found one containing quite ripe achenes.

PLATE 178.—*F. erecta*, Thunbg. (A.) VAR. BEECHEYANA. Fruiting-branch with mature receptacles. 1, apex of young receptacle; 2, base of the same; 3, stipules: *of natural size.*

(B.) VAR. SIEBOLDI. Leaf and receptacle. 4, base of receptacle; 5, apex of the same; 6, 7, 8, male flowers with 1, 2, and 3 stamens; 9, perianth of gall flower; 10, ovary of the same; 11, fertile female flower: *all enlarged.*

164. FICUS TRICOLOR, *Miq. Pl. Jungh.* 53; *Fl. Ind. Bat.* i. *pt.* 2. 295; *Ann. Mus. Lugd. Bat.* iii. 290.—*F. leucocoma*, Miq. Pl. Jungh. 54; Fl. Ind. Bat. i. pt. 2. 295; Ann. Mus. Lugd. Bat. iii. 290.

A tree. Leaves petiolate, thickly membranous, elliptic to sub-obovate-elliptic, with shortly acuminate, rarely rounded apices, and entire or slightly sinuate edges; bases blunt or rounded, 3-nerved; lateral primary nerves 2 to 4 pairs; reticulations distinct and, like the primary nerves, covered with adpressed, brownish, silky hairs on the lower surface; the rest of the lower surface covered with dense, fine, white tomentum; upper surface smooth or with a few short, adpressed-hispid hairs, especially on the nerves; length of blade from 2·5 in. to 4 in.; petioles hirsute, from ·75 in. to 1 in. long; stipules broadly ovate, acute, sericeous externally, about ·5 in. long. Receptacles shortly pedunculate, in pairs in the axils of the leaves or of the scars of fallen leaves, obovate-globose, or sub-pyriform; slightly mammillate when young and densely covered with rather stiff, fulvous hairs; purplish and nearly smooth when ripe and about ·3 in. across; narrowed to the peduncle, and with 3 rather large, ovate-rotund, nearly glabrous basal bracts; peduncles from ·2 to ·3 in. long, pubescent or glabrous. Male flowers with perianth of 3 broad, coloured pieces; stamens 1 or 2; gall flowers sessile or pedicellate; the perianth of 4 lanceolate, distinct pieces; the ovary smooth; the style terminal or lateral; stigma funnel-shaped. Fertile female flowers with perianth of 5 distinct pieces; achene ovoid-globose; the style elongate, lateral; stigma large, hooked.

VAR. LEUCOCOMA. Leaves oblong-lanceolate; the midrib and lateral nerves nearly glabrous beneath. Receptacles ellipsoid, their peduncles nearly glabrous.—*F. leucocoma*, Miq.

Java, at from 3,000 to 6,000 ft.—Junghuhn, Kurz.

This is perhaps only a form of *F. alba*, Reinw., with very hairy fruit. The variety *leucocoma* is apparently rare, having been collected only by Junghuhn.

PLATE 179.—A: branch of *F. tricolor*, Miq., with immature receptacles. 1, apex of receptacle; 2, stipule. B: branch of var. *leucocoma*; 3, apex of a receptacle; 4, stipules—*of natural size*; 5 and 6, monandrous and diandrous male flowers—*opened out*; 7 & 8, sessile and pedicellate gall flowers; 9, fertile female flower: *all enlarged.*

165. FICUS GLANDULIFERA, *Wall. Cat.* 4481.—*Pogonotrophe glandulifera*, Miq. in Lond. Journ. Bot. vii. 77; Miq. Fl. Ind. Bat. i. pt. 2. 331.—*F. aurantiaca*, Miq. Ann. Mus. Lugd. Bat. iii. 293.—*Pogonotrophe aurantica*, Miq. Zoll. Syst. Verz. 93, 99; Fl. Ind. Bat. i. pt. 2. 332.—*Pogonotrophe Sumatrana*, Miq. Fl. Ind. Bat. Suppl. 176, 436.

A small tree with spreading branches; the young shoots covered with short, reddish-brown pubescence. Leaves membranous, petiolate, ovate, or slightly obovate or obovate oblong, gradually narrowed above into the shortly cuspidate apex, and below into the broad, rounded, sometimes slightly emarginate, 3-nerved base; edges quite entire; lateral primary nerves 4 to 5 pairs; the adult leaves when dry of a peculiar pale olive green colour, especially on the lower surface, which is minutely reticulate and glabrous except the midrib and nerves which have some short, soft, adpressed hairs; upper surface glabrous except the midrib and primary nerves which are minutely pubescent; length of blade 3 to 4 in.; petioles ·8 to 1 in. long; stipules broadly ovate, villous, ·2 in. long. Receptacles often crowded, shortly pedunculate, in pairs from the axils of leaves or of the scars of fallen leaves, sub-globular (containing fertile females), or ellipsoid (containing male and gall flowers) with slightly flattened apex; the base slightly constricted and furnished with 3 minute, ovate-acute basal bracts; when young softly pubescent; when ripe yellow, nearly glabrous, ·35 in. across; peduncles ·25 in. long, covered, like the outer surface of the basal bracts and the petioles, with minute brownish-red pubescence. Male flowers only in the ellipsoid receptacles, and associated with gall flowers; the perianth of 4 ovate leaves; stamens 2, elongate, without rudiment of pistil. Gall flowers on hairy pedicels; the perianth of 4 or 5 free pieces; achene sub-globular, smooth. Fertile female flowers in the globular receptacles from which male flowers are quite absent, on hairy pedicels; perianth of 4 or 5 pieces; achene ovate, rugose; the style hairy, and stigma elongate; all the flowers surrounded by the long white hairs of the interior of the receptacle.

Malacca, Penang, Perak, and other parts of the Malayan Peninsula,—*King's Collector*, Nos. 5524 and 5859.

The curious olive green colour of the adult leaves of this when dry is very characteristic. A form of this, the leaves of which dry of a yellowish-green and have rather more numerous lateral nerves than the type, was elevated by Miquel to the rank of a species under the name *F. Sumatrana.*

PLATE 180.—A: branch with ellipsoid receptacles containing male and gall flowers. B: branch with sub globular receptacles containing perfect female flowers (*F. Sumatrana*, Miq.)—*of natural size.* 1, male flower with 2 stamens and 4 perianth leaves; 2, gall flower (from the same ellipsoid receptacle); 3, fertile female flower from sub-globular receptacle: *enlarged.*

166. FICUS MOSELEYANA, *nov. spec.*

A tree ? The young shoots covered with minute reddish-brown adpressed hairs. Leaves clustered near the extremities of the branches, thinly coriaceous, elliptic or obovate-elliptic; the apex blunt; the edges entire, narrowed from above the middle to the slightly cordate 5- to 7-nerved base; primary lateral nerves about 5 pairs; both surfaces glabrous, the lower with distinct reticulations and numerous minute black dots; length of blade 4·5 to 7 in.; petioles ·75 in. to 1 in., puberulous at first, ultimately glabrous; stipules ovate-lanceolate, convolute, puberulous externally, ·4 in. long. Receptacles pedunculate, axillary, in pairs, globose, with rather prominent apical umbilicus, slightly constricted at the base into a short stalk at the junction of which with the peduncle proper are 3 small, broadly-ovate bracts; pubescent when young but glabrous when ripe, about ·5 in. across; peduncle proper pubescent, ·75 in. long.

Little Kei Island.

Collected during the voyage of the *Challenger* by Mr. Moseley, September 1874.

PLATE 181.—Branch of *F. Moseleyana*, King, with mature receptacles—*of natural size.* 1, lateral view of a receptacle; 2, stipule; 3, a basal tract. *Nos.* 1 *to* 3 *are about twice natural size.*

167. FICUS MACROPODA, *Miq. in Lond. Journ. Bot.* vii. 442; *Miq. in Ann. Mus. Lugd. Bat.* iii. 294.

A tree ? the young shoots pubescent; leaves thickly membranous, petiolate, sometimes inequilateral, obovate-oblong; the apex rather blunt; edges entire and slightly revolute; the base emarginate, 3 to 5-nerved; lateral primary nerves 3 to 5 pairs, thick and rather prominent below; the whole of the under surface densely and shortly pubescent; upper surface minutely and harshly pubescent; length of blade 2·5 to 4 in.; petioles ·6 in. long, densely incano-pubescent; stipules ovate, pubescent externally, ·6 in. long. Receptacles in pairs from the axils of leaves or of fallen leaves, tomentose, globose when ripe, ·4 in across, constricted at the base into a stalk ·35 in. long at the junction of which with the pedicel proper are 3 broadly triangular bracts; umbilicus small but prominent; peduncles proper ·2 in. long. Male flowers pedicellate, mixed with gall flowers all over the interior of receptacle; perianth of male of 3 (sometimes 4) ovate-rotund, petiolate, distinct pieces; stamens 2; the anthers as broad as long, the filaments short. Gall flowers usually sessile; the perianth of 5 linear-lanceolate, distinct pieces; the achene minutely punctate, hard, crustaceous; the style very short, terminal; stigma dilated. Fertile female flowers unknown.

Philippines,—*Cuming*, No. 1933.

The only specimen of this which I have seen is at Kew.

Plate 182.—*F. macropoda*, Miq. Branch with mature receptacles containing male and gall flowers—*of natural size.* 1, stipule; 2, basal bract of receptacle; 3, receptacle; 4, male flower; 5, gall flower: all *enlarged.*

168. Ficus pedunculosa, *Miq. in Lond. Journ. Bot.* vii. 442. *t.* 7. *fig.* A.; *Ann. Mus. Lugd. Bat.* iii. 294.—*F. ataktophylla,* Miq. in Ann. Mus. Lugd. Bat. iii. 227, 294.

A tree? The young branches fulvous-pubescent. Leaves thickly membranous, petiolate obovate-elliptic or elliptic-oblong, with rounded or obtusely-pointed apex and entire revolute edges, gradually narrowed to the 3-nerved, slightly oblique, rounded, obtuse, sub-emarginate base; lateral primary nerves 4 to 7 pairs; reticulations minute, rather distinct on the under surface the whole of which, but especially the midrib and nerves, is rather harshly adpressed-pubescent; upper surface glabrescent, the midrib and main nerves puberulous; length of blade 4 to 6 in.; petioles shortly incano-pubescent, from ·6 to ·8 in. long; stipules covered with pale silky hairs ·5 in. long. Receptacles long-pedunculate, solitary (by abortion?); when young densely tomentose, globose, prominently umbonate at the apex, constricted at the base into a slender stalk at the junction of which with the peduncle proper are 3 rather large ovate-acute, villous bracts; peduncle proper slender, pubescent, and about 1 in. long. Mature receptacles unknown. Male flowers in the upper part of the receptacles with the gall flowers, sub-sessile, with perianth of 3 rather broad, distinct pieces; anthers 2, small, narrowly ovate, with short filaments united below. Gall flowers sessile, with 2 (or 3) very broad, distinct perianth leaves; achene broadly ovoid, with sub-terminal style; perfect female flowers unknown.

Philippines,—*Cuming*, No. 1941.

Celebes,—*Teysmann;* Beroe,—*de Vriese.*

I have reduced to this *F. ataktophylla*, Miq., a species which the author himself regarded as very near his previously-described *F. pedunculosa. F. peduncularis*, Wall. Cat. 4528, of which only fragmentary specimens exist, appears to fall here also. This species is not common, and it is very closely allied to *F. macropoda*, Miq. In all the specimens of each of these which I have seen the receptacles are quite young.

Plate 183.—*F. pedunculosa*, Miq. Branch with immature receptacles. 1, stipules; 2, basal bracts; 3, receptacle—*of natural size;* 4, male flower; 5, gall flower: *enlarged. Drawn from specimens collected in Celebes by Teysmann.*

169. Ficus toxicaria, *Linn. Mant.* 305; *Bl. Bijd.* 477; *Miq. in Lond. Journ. Bot.* vii. 286; *Pl. Jungh.* 52; *Fl. Ind. Bat.* i. *pt.* 2. 293. *t.* 20B; *Ann. Mus. Lugd. Bat.* iii. 269, 290.—*F. padana*, Burm. Fl. Ind. 226.—*F. toxica*, Thunbg. Fic. No. 27.—*F. elegans*, Hassk. Cat. Hort. Bogor. 76; Pl. Jav. Rar. 200; Miq. Fl. Ind. Bat. i. pt. 2. 294.

A small spreading tree, with the young branches, stipules, receptacles, and under surfaces of leaves more or less covered with white or tawny, flocculent tomentum. Leaves large, membranous, from broadly ovate-elliptic to elliptic-rotund, narrowed above, and with a short, sharp terminal apiculus; the base more or less deeply cordate and 5- to 7-nerved; the margins minutely serrate-dentate; length of blade 7 to 12 in.; primary lateral nerves 4 to 6 pairs; upper surfaces of leaves with scattered, soft, short hairs; under surfaces densely covered with short, white or yellowish tomentum; reticulations prominent; petioles from 4 to 6 in. long, flocculent when young, but ultimately nearly glabrous; stipules elongate, ovate-lanceolate, convolute, densely sericeous outside, about 1·5 in. long, early caducous. Receptacles short-pedunculate, axillary, in pairs (often solitary by abortion), depressed-globose, umbilicate, densely covered with deciduous, flocculent, yellowish or white tomentum; when ripe blackish purple and from 1 to 2 in. in diameter; peduncle short, thick, hairy like the petioles and with 3 or 4 broadly ovate-acute, imbricated bracts near its base. Male flowers few near the mouth of the receptacles containing gall flowers, sessile; the perianth of 4 or 5 concave pieces 2 of which are sometimes narrower than the others; anthers 2, elongate, on short filaments. Gall flowers pedicellate; the perianth of 5 lanceolate pieces; ovary smooth, ovoid; style short, sub-terminal; style infundibuliform. Fertile female flowers pedicellate; the achene ovoid, minutely tuberculate; style lateral, elongate; stigma cylindrical, constricted.

Java and Sumatra, at elevations of from 2,000 to 4,000 ft.

Rather variable as to foliage, the leaves of young shoots being often very large, palmately 5- to 7-nerved, and deeply divided into 5 to 7 blunt lobes. The colour of the tomentum varies from white to cinnamon-brown. Miquel (l.c. tab. XXB) gives excellent figures (which I have copied) of the two kinds of female flowers (insect-attacked, *i.e.* gall, and fertile), without, however, understanding the difference between them.

Plate 184.—*F. toxicaria*, Linn. 1, branch with immature receptacles; 2, branch with mature receptacles; 3 & 4, apex and base of mature receptacle; 5, stipules—*of natural size;* 6, male flower; 7 & 8, gall flowers; 9, fertile female flower: *all enlarged.*

170. Ficus palmata, *Forsk. Fl. Ægypt-Arab.* 179; *Vahl. Symbol.* i. 84. t. 24; *Miq. in Ann. Mus. Lugd. Bat.* iii. 290; *Lond. Journ. Bot.* vii 225.—*F. caricoides*, Roxb. Fl. Ind. iii. 529; Miq. in Lond. Journ. Bot. vii. 224.—*F. pseudo-sycomorus*, Decaisne in Fl. Sinaic.; Miq. in Lond. Journ. Bot. vii. 227; Boiss. Fl. Orient. iv. 1155.—*F. virgata*, Roxb. (non Reinw.) Fl. Ind. iii. 530; Wight's Icon 649; Miq. in Lond. Journ. Bot. vii. 228; Fic. Afric. 130; Brandis For. Flora 419; Wall. Cat. 4507A and B ?, 4492A, B, C, D.

A bush or small tree, never epiphytal. The young branches tomentose or pubescent, often becoming glabrous. Leaves petiolate, membranous, rotund-ovate, or more often rotund-cordate, the base 3-nerved, the apex acute or minutely apiculate; the margins serrate or dentate, occasionally with 3 to 5 obtuse lobes; lateral primary nerves 3 to 6 pairs; upper surface scabrous, the lower scabrid or shortly tomentose; length of blade from 1·5 in. to 5 in.; petioles from 1 to 2 in. long; stipules ovate-acute, pubescent, 2 to each leaf, deciduous. Receptacles pedunculate, solitary, axillary, sub-globular to pyriform, umbonate, constricted towards the peduncle, tomentose, pubescent or glabrous; when ripe yellowish; basal bracts 3 or more, acute, deciduous; from ·5 in. to 1 in. in diameter; peduncles from ·5 in. to 1 in. long, pubescent or glabrous. Male flowers numerous in the upper half of the receptacles containing gall flowers, on long, hairy pedicels; the perianth of 4 or 5 lanceolate hairy pieces; stamens 3 to 6, with short filaments. Gall flowers sessile or pedicellate, with a gamophyllous, deeply 5-cleft, hyaline perianth; the ovary ovoid, smooth; style very short, lateral; stigma dilated. Perfect female flowers with perianth like the gall flowers; the achene trigonous, minutely tuberculate; the style elongate, hairy, sub-terminal; the stigma bifid.

Plains of Northern India; the North-Western Himalaya up to 3,000 ft.; Afghanistan; also in Arabia, Egypt, and Abyssinia.

The two forms named *F. caricoides* and *virgata* by Roxburgh appear to me to be botanically identical, the only difference between them noted by Roxburgh in his descriptions and manuscript drawings in the Calcutta Herbarium being in size. *F. caricoides* he described from a cultivated specimen sent to him from Lucknow, *F. virgata* he described from wild specimens; and in my opinion the former is only the cultivated form of the latter. I do not see how either differs from the older species *palmata* of Forskall, except that the leaves are not so scabrid. And this is a difference that can easily be accounted for by climate. I have no hesitation, therefore, in reducing both Roxburgh's species as well as *pseudo-sycomorus* of Decaisne to *F. palmata*, Forsk. Moreover, I find no differences between the flowers of these four. And I have a strong suspicion that all may be but forms of *F. carica*, Linn. In the Linnæan Society's set of Wallich's plants, No. 4507A (named *F. caricoides*, Roxb.) is in my opinion true *F. carica*, L. Sheet B is absent from the set. In the Calcutta Herbarium set both A and B are *caricoides*.

PLATE 185.—*F. palmata*, Forsk. A: fruiting twig with undivided leaves. B: twig with 5-lobed leaves. 1 apex of a young receptacle; 2, stipule—*of natural size;* 3, male flower with 3 stamens; 4, male flower with 5-merous perianth, the stamens having been removed; 5, gall flower; 6, ovary of gall flower; 7 & 8, fertile female flowers; 9, achene of fertile female flower: *all enlarged.*

171. FICUS ALBA, *Reinw. in Bl. Bijd.* 467; *Miq. Fl. Ind. Bat.* i. *pt.* 2. 294, *Supp.* 173, 424; *Ann. Mus. Lugd. Bat.* iii. 270, 290.—*F. nivea*, Bl. Bijd. 476; Miq. Fl. Ind. Bat. i. pt. 2. 294.—*F. mappan*, Miq. Fl. Ind. Bat. Supp. 173, 425.—*F. gossypina*, Wall. Cat. 4488; Miq. in Lond. Journ. Bot. vii. 455; Fl. Ind. Bat. i. pt. 2. 294; Supp. 173, 425.—*F. bicolor*, Herb. Hook.—?*F. palmata*, Roxb. Fl. Ind. iii. 529.—*F. Hunteri*, Miq. Lond. Journ. Bot. vii. 225; Fl. Ind. Bat. i. pt. 2. 296.

A small tree, with very variable leaves which vary from intensely white to pale cinnamon-coloured beneath. Leaves long-petiolate, membranous, varying from ovate-lanceolate, ovate, or sub-rhomboid-elliptic with narrowed rarely cordate base, to rhomboid-sub-obovate-rotundate with a more or less deeply cordate or narrowed base; apex more or less acuminate, sometimes deeply divided into 3 acute lobes; edges irregularly dentate; length of blade from 5 to 8 in.; base 3-nerved; lateral primary nerves about 3 or 4 pairs, rather prominent; secondary nerves transverse. (The leaves of young shoots are often very large, have palmate nervation, and are divided into as many as 5 to 7 lobes.) Upper surfaces of leaves scabrid or sparsely hispid, especially on the nerves; lower surface (except the nerves which are nearly glabrous) densely covered with short, usually white, sometimes reddish-white tomentum; petioles 1·5 to 3 in., pubescent or glabrous; stipules ovate-lanceolate, pubescent at first, ultimately glabrous, from ·3 to ·5 in. long. Receptacles sessile, in pairs, axillary, depressed-globose, rarely ovoid, slightly umbonate; when young pubescent; when ripe smooth, bright yellow in colour, and from ·3 in. to ·4 in. across; basal bracts 3, broadly ovate, blunt. Male flowers few, and only near the mouth of the receptacles containing gall flowers, sessile, short, broad; the perianth of 3 broad, imbricated, free pieces; stamens 1 or 2. Gall flowers mostly pedicellate; the perianth of 5 lanceolate pieces; the ovary ovoid, smooth; style short, lateral; stigma infundibuliform. Fertile female flowers sessile, or shortly pedicellate; the achene obliquely ovoid, with a very tuberculate, crustaceous epicarp; style lateral, as long as the achene; stigma cylindric.

Southern part of the Malayan Peninsula, and over the whole Archipelago, up to elevations of 4,000 ft. Very common and variable.

I have little doubt that a tri-lobed form of this formed the basis of the Roxburghian species *F. palmata.*

PLATE 186.—*F. alba.*, Reinw. 1, fruiting-branch; 2, ovate-cordate leaf; 3, ovate-lanceolate leaf; 4, tri-lobed leaf; 5, vertical section of receptacle—*of natural size;* 6, diandrous male flower; 7, monandrous male flower; 8 & 9, gall flowers; 10, fertile female flower—*all enlarged.*

172. FICUS FULVA, *Reinw. in Bl. Bijd.* 478; *Miq. in Ann. Mus. Lugd. Bat.* iii. 269, 290; *Pl. Jungh.* 54; *Miq. Fl. Ind. Bat* i. *pt.* 2. 296; *De Vriese, Pl. Rar. du Jard de Liede, fasic,* 1.—*Pogonotrophe flavidula,* Miq. Fl. Ind. Bat. Supp. 176, 435.—*F. Reinwaratii,* Link and Otto. Icon rar. i. 6. tab. 31.; Miq. in Lond. Journ. Bot. vii. 457.—*F. suborbicularis,* Miq. Fl. Ind. Bat. Supp. 173, 425.—*F. apiculata,* Miq. Zoll. Syst. Verz. 92, 98; Fl. Ind. Bat. i. pt. 2. 296; Ann. Mus. Lugd. Bat iii. 269, 290.—*F. chlorocarpa,* Miq. Fl. Ind. Bat. i. pt. 2. 294.

A small umbrageous tree. The young branches covered with harsh dark brown tomentum. Leaves crowded towards the apices of the branches, long-petiolate, membranous, sub-rhomboidal, rotund, or obovate-rotund, rarely ovate-elliptic, sometimes sinuate or (in the leaves of young plants) deeply 3- to 5-lobed; edges minutely and remotely dentate-serrate; apex acute or very shortly apiculate; base rounded or more or less deeply cordate, 5- to 7-nerved; upper surface scabrid, tomentose on the nerves; lower surface everywhere covered with rather harsh tawny tomentum; lateral nerves 2 to 4 pairs; length of blade from 4 to 8 in; petioles 1·5 to 3·5 in. long, pubescent; stipules single, convolute, broadly ovate, with a truncate base and acute apex, externally covered with deciduous yellow hairs. Receptacles crowded towards the apices of the branches, sessile or very shortly pedunculate, in pairs in the axils of the leaves; from ovoid to globose; apex umbilicate; densely fulvous-tomentose; yellowish red when ripe and about ·5 in. to ·75 in. across; basal bracts 3, ovate-rotund, villose. Male flowers only near the mouth of the receptacles with gall flowers, sessile; the perianth of 3 large oblong pieces, much longer than the 2 oblong anthers; filaments short, adnate. Gall flowers sessile or shortly pedicellate; the perianth of 5 narrowly lanceolate pieces; the ovary ovoid, shining, smooth; the style short, lateral; stigma infundibuliform. Fertile female flowers sessile or pedicellate; the perianth like that of the gall flowers; the achene obliquely ovoid, minutely tuberculate; the pericarp hard and crustaceous.

Malayan Archipelago and Peninsula, Andaman Islands, and Burmah.

This is not very well represented in collections, although it is by no means an uncommon tree in Western Java. A form of this with narrower leaves, smoother on the upper surface than those of the type, was separated as a variety under the name *orbicularis* by Miquel; but it scarcely deserves separation even as a variety. The plant issued as Herb. Zoll. 651 was originally named *F. fulva*, Reinw., by Zollinger himself, but Miquel made a species of it under the name *apiculata*. Miquel had previously given the name *apiculata* to a species collected by Wight (No. 1916 *Herb. Wight*), which I have not seen, but which, judging from Miquel's description (Lond. Journ. Bot. vi. 570), was a *Urostigma*. The reduction of *F. chlorocarpa*, Miq., to this *apiculata* was made by Miquel himself. I have seen no specimen of it.

Receptacles containing male and gall flowers are by no means common. Count Solms Laubach states (*Bot. Zeit.* for 1885, p. 516) that during his stay at Buitenzorg he had never been able to find one with male flowers. Some specimens which I myself collected in the Preanger Province of W. Java bear such receptacles, and from one of these the figures given by me have been drawn. The forms of this species may be grouped into two sets, as follows:—

FORMA TYPICA. Leaves rounded, more or less lobed. This is the form originally named *fulva* by Reinwardt.

VAR. MINOR. Leaves ovate or elliptic. Under this fall the forms described as *flavidula* and *chlorocarpa* by Miquel.

PLATE 187.– *F. fulva*, Reinw. 1, fruiting-branch of *forma typica;* 2, leaf and receptacles of var. *minor;* 3, stipules of No. 1—*of natural size;* 4, male diandrous flower; 5, gall flower; 6, ovary of the same, the perianth being removed; 7, 8, 9, fertile female flowers at various stages of growth; 10, fertile achene: *all enlarged.*

173. FICUS HIRTA, *Vahl. Enum.* ii. 201; *Roxb. Fl. Ind.* iii. 528; *Wight Icon* 672; *Miq. in Lond. Journ. Bot.* vii. 456; *Miq. Fl. Ind. Bat.* i. *pt.* 2. 297. tab. 18; *Miq. in Ann. Mus. Lugd. Bat.* iii. 290; *Benth. Fl Hong-Kong,* 320; *Ann. Mus. Lugd. Bat.* iii. 290.—*F. setosa*, Bl. Bijd. 477; Miq. in Lond. Journ. Bot. vii. 456; Hook. & Arn. Beechey. Voy. 216. t. 49.—*F. setifera*, Steud.—*F. hibiscifolia*, Champ. Hook. Journ. Bot. and Kew Gard. Miscell. vi. 77.—*F. Roxburghii*, Miq (non Wall.), Lond. Journ. Bot. vii. 456.—*F. triloba*, Ham. Wall. Cat. 4491A, B. C; Miq. in Ann. Mus. Lugd. Bat. iii. 270, 290; Brandis Forest Flora, 423; Kurz For. Flora Brit.

Burmah ii. 419.—*F. hirsuta* (not of Schott), Roxb. Fl. Ind. iii. 528; Wight Icon 670.

A shrub or small tree. The young branches hollow, and the leaves, stipules, and receptacles pubescent-hispid, often rufescent or tawny. Leaves membranous, petiolate, very variable in shape, from 5 to 12 in. long, oblong-lanceolate, ovate-elliptic to ovate-rotund; apices acute or acuminate, often (especially in the leaves of young shoots) with 3 to 5 acute or blunt lobes; edges serrate; bases rounded or cordate, 3- to 7-nerved; lateral nerves 2 to 7 pairs; upper surface scabrous-hispid, lower densely hispid-hirsute, pubescent, or tomentose, especially on the nerves; petioles from ·75 to 4 in. long, hirsute; stipules ovate-lanceolate, acuminate, strigose or hirsute at first, afterwards puberulous, from ·5 to ·75 in. long, deciduous. Receptacles shortly pedunculate or sessile, in pairs from the axils of the leaves or of the scars of fallen leaves, globular or ovoid, more or less umbonate especially when young; from ·3 to 1 in. across; at all times densely covered with long, stiff, often rufescent, bristly hairs; apical scales numerous, some of them very large; basal bracts ovate-acuminate, adpressed-pubescent; perianth of all the flowers of 4 linear-lanceolate, smooth pieces. Male flower with 2 stamens, occasionally 3, and sometimes only 1. Gall ovary globular or ovoid, smooth; the style short, lateral; stigma infundibuliform. Fertile female flowers pedicellate or sessile; the achene minutely tuberculate, ellipsoid, emarginate at the side to which is attached the long filiform style; stigma cylindric.

In the forests at the base of the eastern half of the Himalaya, Assam, Burmah, the Malaya Peninsula and Archipelago, China; at elevations from 2,000 to 5,000 ft.

A widely-distributed and very variable plant. The form described by Vahl is that found in China and the Malayan countries. In the North-Indian area of the species, this form is almost entirely supplanted by the broad-leaved, large-fruited, densely-rufescent form issued as Wall. Cat. 4491 under the manuscript name *F. triloba*, Ham. Hamilton's name is a most unfortunate one, as trees are quite common on which not a single trilobed leaf can be found. I think it better therefore to retain for this Northern variety Miquel's name of *Roxburghii*, which is separated from typical *hirta*, Vahl., as follows:—

TYPICAL HIRTA, *Vahl.* Leaves obovate-oblong, oblanceolate, or lyrate; receptacles about the size of a large pea or small cherry.

VAR. ROXBURGHII. Leaves ovate to ovate-rotund, often deeply lobed, from 6 to 12 in. long; receptacles from ·5 to 1 in. across.—*F. Roxburghii*, Miq.

The two forms meet in the Khasia Hills, but I have never seen a specimen of the variety *Roxburghii* from farther south.

The receptacles in some individual plants are sub-globular, with, however, a tendency to be umbonate at the apex; in other individuals the receptacles are ovoid and are so much umbonate towards the apex as to be in some cases almost obpyriform in general outline. The majority of the globular receptacles which I have examined contain fertile female flowers without any trace of males. In the ovoid receptacles, on the other hand, perfect male flowers are rather numerous in the usual situation beneath the scales near the mouth of the receptacles; and in some cases the males are so numerous as to fill the upper half of the receptacle, the remaining space being occupied by gall flowers.

PLATE 188.—*F. hirta*, *Vahl.* 1 & 2, leaves and receptacles; 3, stipules—*of natural size;* 4, diandrous male flower; 5, monandrous male; 6 & 7, gall flowers—*all from the same receptacle: enlarged.*

PLATE 189.—*F. hirta*, Vahl. var. *Roxburghii*. 1, twig (reduced in size); 2, an ovoid receptacle; 3, vertical section of another—*of natural size;* 4, male flower; 5, gall flower from ovoid receptacle—*enlarged;* 6, globular receptacle from another plant; 7, vertical section of the same—*of natural size;* 8, fertile female flower from the globular receptacle: *enlarged.*

174. FICUS DUMOSA, *nov. spec.*

A shrub, 3 to 9 ft. high. Leaves long-petiolate, membranous, from ovate-elliptic, acuminate (rarely sinuate), to palmate with from 3 to 5 deep acuminate lobes; edges of all the forms irregularly dentate; the apices of the lobes cuspidate; base cordate or rounded, sometimes sub-auriculate, 5- to 7-nerved; upper surface scabrid, papillose, each papilla bearing a stiff hair; the nerves tomentose-hispid; under surface more sparsely hispid, hirsute on the nerves; lateral primary nerves 5 to 6 pairs; reticulations distinct; length of blade 5 to 9 in.; petioles slender, hispid, from 2 to 4·5 in. long; stipules lanceolate, hispid at first, but subsequently glabrous, about ·8 in. long. Receptacles axillary, sessile, in pairs, depressed-globose, the umbilicus small, few-bracted; sparsely hispid when young; scarlet to lake-red in colour and smooth when ripe, and from ·5 to 1 in. across; basal bracts 3, minute, ovate, spreading. Male flowers in the receptacles with the gall flowers, and near the mouth only; the perianth of 4 broad, distinct pieces; stamens 2 perfect, or 1 perfect and a rudimentary pistil. Gall flowers pedicellate or sub-sessile; the perianth of 5 lanceolate free pieces; ovary globose, smooth; style short, lateral; stigma infundibuliform. Fertile female flowers sub-sessile or pedicellate; perianth as in the gall flowers; achene obliquely ovoid, slightly viscid, minutely tuberculate; the style elongate, lateral; stigma pyramidal.

Kaiser's Peak, Mount Dempe, and other hills in Eastern Sumatra, from 2,000 to 6,000 ft.,—*Mr. H. O. Forbes* (*Herb.* No. 229).

This is closely allied to *F. alba*, Reinw., but it is well distinct, differing from typical *alba* by its larger receptacles; and longer petiolate, thinner leaves which are sparsely hispid on both surfaces and not tomentose below. The occasional occurrence of a rudimentary pistil connects this with the section *Palæomorphe*, the members of which it does not, however, in any other way resemble.

PLATE 190.—*F. dumosa*, King. 1 & 2, branches with immature receptacles; 3, branch with mature receptacles; 4, stipules; 5 & 6, apex and base of an immature receptacle—*all of natural size;* 7, ovate-elongate, sinuate leaf—*reduced in size;* 8, diandrous male flower; 9, male flower with 1 stamen and a rudimentary pistil; 10, gall flower; 11, fertile female flower: *all enlarged.*

175. FICUS CHRYSOCARPA, *Reinw. in Blume's Bijd.* 475; *Miq. Fl. Ind. Bat.* i. *pt.* 2. 302; *Supp.* 173, 427; *Ann. Mus. Lugd. Bat.* iii. 270, 291.—*F. aurata*, Miq. Ann. Mus. Lugd. Bat. iii. 271, 291.—*Covellia aurata*, Miq. Fl. Ind. Bat. Supp. 175, 433.—*F. densiserra*, Miq. Fl. Ind. Bat. Supp. 426 —*F. arguta*, Wall. Cat. 4489.

A tree, 10 to 30 ft. high. The young branches hollow and, like the leaves, stipules, and receptacles, more or less covered with hispid-rufous or yellowish pubescence. Leaves membranous, petiolate, elliptic, oblong-lanceolate or oblanceolate, never lobed, narrowed to the

3-nerved but not cordate base; the apex acute; the edges serrate; upper surface rough from a few adpressed-hispid hairs; the midrib and nerves shortly hispid; lower surface pubescent, often shortly tomentose; primary lateral nerves 3 or 4 pairs; length of blade 4 to 7 in.; stipules lanceolate, rufous-tomentose, about ·6 in. long. Receptacles sessile or very shortly pedunculate, in pairs, axillary, ovoid when young, nearly globular when ripe and ·6 in. across; at all ages densely covered with short, rather soft yellowish hair; apical scales few and small; basal bracts 3, broadly ovate; the interior of the receptacle between the insertion of the flowers densely covered with hispid yellow hair. Male flowers with 2 stamens; the perianth of 4 broadly ovate, hyaline, glabrous pieces. Gall flowers with a perianth of 4 narrowly oblanceolate pieces, each of which is tipped by a tuft of long hairs; the ovary ovoid, smooth; style short, lateral. Fertile female flowers with perianth like the galls; the achene ellipsoid, sub-rhomboid, wrinkled, and boldly tuberculate; style long, lateral, hairy; stigma cylindric.

In Burmah; in the low country in the Malayan Peninsula; in Penang, Java, and Sumatra.

This species resembles the forms of *hirta* with small unlobed leaves, and I was at one time inclined to consider it as only a variety of that species. But this is a larger tree than *hirta*; the leaves of this have no tendency to be lobed; the pubescence of this is softer, and the receptacles are more uniform in shape than in *hirta*. Moreover the flowers, both male and female, differ much from those of *hirta*.

I have reason to believe that the following specimens of this species were distributed by me as *F. hirta*, Vahl., viz. *King's Collector* Nos. 92, 133, 148, 3738, 4328, and 5834; *H. O. Forbes*, No. 2967.

PLATE 191.—*F. chrysocarpa*, Reinw. A & B: leaves with receptacles. 1, apex of receptacle; 2, base of the same; 3, stipules—*of natural size*; 4, male flower; 5, gall flower; 6, fertile female flower; 7 & 8, achenes removed from fertile female flowers: *all enlarged*; C—leaf of the form named *F. arguta* by Wallich.

176. FICUS SCHEFFERIANA, *nov. spec.*

A small tree. The young parts at first sparsely hirsute, afterwards nearly glabrous. Leaves crowded near the extremities of the branches, rather long-petiolate, chartaceous, slightly inequilateral, elliptic, with acuminate apex and narrowed, 3-nerved, base; or 3-lobed (one of the lateral lobes sometimes absent), the lobes blunt or acuminate, and the base cuneate and 5-nerved (2 of the nerves minute); edges entire or remotely sinuate or sub-serrate, glabrous, except the midrib and nerves which on the upper surface are adpressed-pubescent; lateral primary nerves 3 to 4 pairs; reticulations rather distinct; length of blade 5 to 6 in.; petioles slender, from 1·25 to 2 in. long; stipules ovate-acute, membranous, glabrous, ·6 to ·75 in. long. Receptacles crowded, sessile, in pairs, axillary, depressed-globose, with small, few-scaled umbilicus; sparsely hirsute when young; smooth when ripe and of a dull lake colour, about ·5 in. across, with 3 small, broad, ovate-acuminate, wavy basal bracts. Male flowers few and only near the mouth of the receptacle, sessile; the perianth of 4 broadly-ovate, imbricate pieces; stamens 2, lying face to face, their filaments stout, adnate. Gall flowers sessile or pedicellate; the perianth of 5 distinct, oblanceolate pieces; the ovary globose, smooth; style lateral, very short; stigma dilated. Fertile female flowers not known.

Sumatra,—*Sig. Beccari*, Becc. Herb. P. S. 165. Mount Dempe, in Eastern Sumatra, at an elevation of 7,500 ft.,—*H. O. Forbes.*

This species is related to *F. alba* and *F. dumosa*, but is in my opinion separable from both. I have named it in honor of my late lamented friend, Dr. Rudolph Scheffer, Director of the Botanical Garden at Buitenzorg, in Java.

PLATE 192.—*F. Schefferiana*, King. Branch with mature receptacles. 1 & 2, lobed leaves from another specimen; 3, apex of a receptacle; 4, base of the same; 5, stipules—*of natural size;* 7, unexpanded male flower; 8, one piece of the perianth of male flower; 9, the two stamens; 10, gall flower; 11, ovary of the same, the perianth having been removed: *all enlarged.*

177. FICUS VARIOLOSA, *Lindl. Benth. in Hook. Lond. Journ. Bot.* i. 492; *Benth. Fl. Hong-Kong* 328; *Miq. in Ann. Mus. Lugd. Bat.* iii. 294; *Maxim. Bull. Acad. St. Petersb.* xi. 336.

A glabrous shrub. Leaves thinly coriaceous, petiolate, oblanceolate or oblong-lanceolate; the apex sub-acute or obtusely acuminate; edges entire, recurved; base cuneate, not 3-nerved; lateral primary nerves 8 to 10 pairs, rather horizontal; reticulations wide, indistinct; length of blade from 2·5 to 4·5 in.; petioles ·3 to ·4 in.; stipules ovate-acuminate, about ·3 in. long. Receptacles pedunculate, axillary, in pairs, globular; the apex umbonate, especially when young; the umbilical bracts large; basal bracts 3, ovate triangular, spreading, united below; when ripe glabrous and more or less verrucose, about ·4 in. across; peduncle slender, ·3 to ·5 in. long. Male flowers not seen. Fertile female flowers pedicellate or sub-sessile; the perianth of 3 or 4 distinct pieces; achene trigonous, minutely wrinkled; the style long, lateral.

Hong-Kong; Perak, in the Malayan Peninsula,—*King's Collector*, No. 7016.

PLATE 193.—Branch of *F. variolosa*, Lindl., with mature receptacles. 1, receptacle; 2, apex of the same; 3, stipules—*all of natural size;* 4, fertile female flower; 5, achene; 6, perianth: *enlarged.*

178. FICUS FORMOSANA, *Maxim. in Bull. Acad. St. Petersb.* xi. 331.

A small tree? The young branches sparsely pilose when very young, but ultimately quite glabrous. Leaves petiolate, membranous, oblanceolate, or oblong-lanceolate, tapering from above the middle to the acute 3-nerved base; the apex rather suddenly cuspidate; the edges entire or sinuate; primary lateral nerves 6 to 8 pairs, the lower 2 or 3 pairs almost horizontal, all prominent on the under surface and, like the midrib, shortly adpressed-hispid; the lower surface pale in colour, minutely tuberculate; upper surface glabrous; length of blade 2·5 to 3·5 in.; petiole ·4 in. long; stipules lanceolate, glabrous, ·25 in. long Receptacles shortly pedunculate, axillary, solitary, ovoid, constricted towards the base; the umbilical scales prominent; when young sparsely hispid; when adult glabrous and about ·25 in. across; basal bracts 3, broadly ovate-acute, smooth. Male flowers pedicellate; the perianth of from 2 to 4 pieces, diandrous. Fertile female flowers sessile; the perianth of 4 pieces; the style elongate, lateral; stigma narrowly cylindric. Male flowers (*fide* Maximowicz) pedicellate, diandrous; the perianth of from 2 to 4 pieces. Females (no doubt galled) pedicellate or sessile; the perianth of 4 pieces; the style sub-terminal; the stigma obliquely truncate; achene, globose, sub-sessile.

Formosa,—*Oldham*, Nos 551 and 554.

Maximowicz (l.c.) remarks that this species comes near *F. cuspidata*, Reinw., *rostrata*, Lamk., and *caudata*, Wall. (*i e. clavata*, Wall.)—an opinion in which I quite agree. The more sinuately-leaved forms of it also come near *F. pandurata*, Hance (a species which Maximowicz says he had never seen), and I believe this is little more than a geographical variety of that species. *F. Formosana* is little known, and is poorly represented in all collections which I have consulted except that of Kew. I have not myself seen male or gall flowers. The fertile female flower of which I gave a figure was taken by me from Oldham's *Herbarium* specimen No. 554. Maximowicz (*Bull. Acad. St. Petersb.* xi. 331) describes male and also female flowers. His description clearly indicates that the females he met with were gall flowers.

Plate 777A.—A: branches of *F. Formosana*, Maxim., with oblanceolate leaves and immature receptacles and with lanceolate leaves and mature receptacles. 1 apex of a receptacle; 2, side view of the same; 3, stipules—*all of natural size;* 4, fertile female flower (from Oldham's *Herbarium*, No. 554): *enlarged.*

179. Ficus Silhetensis, *Miq. Ann. Mus. Lugd. Bat.* iii. 223, 291.—*F. umbonata*, Wall. Cat. 4518 (non Reinw.); Miq. in Lond. Journ. Bot. vii. 437.

A shrub; the young shoots tomentose. Leaves petiolate, membranous, ovate-lanceolate or oblanceolate; the apex acute or acuminate; edges entire, sometimes minutely undulate when dry; the base bluntish or acute, 3-nerved; primary lateral nerves 3 or 4 pairs; under surface minutely tuberculate, more or less hispid-pubescent; the reticulations fine; upper surface with a few adpressed deciduous hairs, ultimately nearly glabrous; length of blade 2·5 to 4 in.; petioles pilose, about ·5 in. long; stipules lanceolate, glabrous, ·5 in. long. Receptacles very shortly pedunculate or almost sessile, axillary, in pairs or solitary, ovoid and much umbonate when young; umbilical scales numerous; when old nearly globular, sparsely pilose, reddish; when ripe about ·35 in. across; basal bracts 3, minute. Male flowers pedicellate; the perianth of 3 distinct leaves; stamens 2; anthers elongate. Gall flowers with shorter pedicels than the males and a 3-leaved perianth; ovary rounded, smooth; the style short, lateral. Fertile female flowers nearly sessile; the perianth of 3 distinct pieces; achene flattened, obovoid, minutely papillose, with the edges thickened, purple, variegated; style long, lateral, curved, deflexed, not hairy.

Assam, Silhet, Khasi Hills, up to 4,000 ft.

There is a form of this, of which I give a figure, with the leaves much narrowed to the base and the petioles about ·75 in. long; but it is hardly worth separating as a variety. This plant comes so near *F. erecta*, Thunbg., differing little except in its smaller size and sessile receptacles, that I keep it up as a species with great reluctance, and chiefly as a matter of convenience. The probability of its identity with *F. erecta* is strengthened by the occurrence of var. *Sieboldiana* of the latter both in Sikhim and Khasia.

Wallich issued this species as No. 4548 of his Catalogue under the name *F. umbonata*, Wall. This name had, however, been preoccupied by a plant collected by Reinwardt in the Moluccas and described by Blume (*Bijd.* 454), of which no authentic specimen now exists at Leiden or Utrecht. Blume's description shows Reinwardt's plant not to have been very different from this. Miquel, however, regarded the two as differing, and described this as *F. Silhetensis*, which name I retain.

Plate 194.—*F. Silhetensis*, Miq. A: branch with young ovoid receptacles. B: branch with mature, globular, umbonate receptacles. C: leaf of the form with attenuate base and long-petiolate leaves. 1, apex of a receptacle; 2, base of the same; 3, stipules—*all of natural size;* 4, male flower; 5, gall flower (*from the same receptacle as the male*); 6, perianth of fertile female flower; 7, fertile achene: *enlarged.*

180. Ficus duriuscula, *nov. spec.*

A tree. All parts glabrous, but rather harsh and sub-scabrid. Leaves petiolate, membranous, elliptic or elliptic-lanceolate; the apex rather shortly acuminate; the edges undulate, sub-crenate; the base boldly 3-nerved, biglandular; primary lateral nerves 4 to 6 pairs, thin but strong as are the midrib and secondary nerves; reticulations minute, very distinct on the lower surface; both surfaces glabrous, the lower harsh to the touch; length of blade 5 to 10 in.; petioles swollen at either extremity, varying in length from ·5 in. to 1 in.; stipules lanceolate, glabrous, ·25 in. long. Receptacles axillary or in fascicles of from 3 to 6 from small, broad, flat, ebracteate tubercles from the stem and larger branches, pedunculate, globose; their sides slightly ridged towards the sub-umbonate apex, glabrous, muriculate-scabrid, ·5 in. in diam.; the base slightly constricted, ebracteate; peduncle thin, ·4 in. to ·8 in. long, with a few scattered small bracteoles, scabrid. Male flowers with 2 stamens and a 5- or 6-cleft, hairy, perianth; gall flowers with a perianth similar in shape, but not hairy; the ovary ovoid; the style short, lateral. Fertile female flower with the achene ovoid, smooth, mucilaginous externally when ripe; the style lateral, longer than the ovary, curved; the stigma obovate; the perianth as in the gall flower.

Soron, New Guinea,—*Sig. Beccari* (Herb. Becc. P.P. No. 188); *H. O Forbes*, No. 765.

A species allied to *F. Madurensis*, Miq., and to the Australian *F. magnifolia*, Mull., but with shorter petioles and more muricate receptacles. This also comes near *brevicuspis*, Miq., but its leaves are not obovate and their bases are not cordate, as in that species. They are, moreover, longer, more pointed, and have shorter petioles. This also resembles *F. balica*, Miq., and *F. copiosa*, Steud.

The receptacles in Forbes's specimens are axillary, and are more muricate than in Beccari's No. 188. The leaves are also rather longer. It is possible that when better material shall be forthcoming the two forms may be found to be separable specifically: at present I include them under one species.

Plate 195.—*F. duriuscula*, King. 1, apex of leafy branch; 2 fascicles of mature receptacles from the stem—*of natural size;* 3, a receptacle—*slightly enlarged;* 4, a stipule—*much enlarged;* 5, male flower; 6, gall perianth; 7, gall ovary from the same receptacle (*taken from Beccari P. P.* No. 188); 8, fertile female achene: *enlarged.* (From Forbes's No. 765.)

181. Ficus macilenta, *nov. spec.*

A shrub. The young shoots with a few scattered short, stiff hairs, ultimately glabrous. Leaves unequally petiolate, thinly membranous, narrowly elliptic; the apex shortly acuminate; the edges with a few distinct teeth; base rounded, boldly 3-nerved; primary lateral nerves about 8 pairs, horizontal; both surfaces glabrous when adult except the stout midrib which has a few scattered hairs in the young leaves; all the nerves sparsely hispid-pilose on the lower surface; length of blade 5 or 6 in.; petioles 1 to 1·5 in., slender, glabrous; stipules lanceolate, ·4 in. long. Receptacles sessile, solitary, axillary, globose, recurved, and covered with soft, long, straight hairs, ·25 in. across; basal bracts 3, minute.

Sarawak, Borneo, at an elevation of about 3,000 ft.,—*Sig. Beccari* (Herb. Becc. P. B. 1696).

This is a weak, straggling species, related in the form and venation of its leaves to *F. cuspidata*, Reinw. var. *sinuata*.

Plate 196.—*F. macilenta*, King. Branch with mature receptacles. 1, apex of a receptacle; 2, base of the same; 3, stipules: *all of natural size.*

182. Ficus comitis, *nov. spec.*

Young branches glabrous; leaves membranous, elliptic; the apex shortly and narrowly cuspidate; the base broad, 3-nerved; primary lateral nerves about 8 pairs, diverging from the thick, strong midrib at a wide angle, prominent on both surfaces but specially so on the lower which is thickly dotted with minute white tubercles and glabrous except on the midrib and primary nerves which are densely and softly puberulous; reticulations minute, very distinct; upper surface glabrous, thickly dotted with tubercles like those on the under surface but slightly larger; length of blade 4 to 6 in.; petiole from ·75 in. to 1·75 in.; stipules lanceolate, ·6 in. long. Receptacles pedunculate, axillary, in pairs, sub-globose, or sub-pyriform; the umbilicus rather prominent; adpressed-puberulous, slightly verrucose, about ·25 in. across; basal bracts none; pedicel ·3 in. long, bearing 3 minute bracteoles below its middle.

New Guinea,—*D'Albertis* (*Herb. Beccari, P. Papuanæ,* No. 531).

This has been collected only by Count D'Albertis. Its affinities are with *F. chartacea*, Wall.

Plate 197.—Branch of *F. comitis*, King, with mature receptacles—*of natural size.* 1, stipule; 2 & 3, receptacles: *enlarged.*

183. Ficus Odoardi, *nov. spec.*

A tree. The young shoots covered with brown tomentum; the leaves oblong-elliptic, slightly inequilateral, gradually narrowed upwards to the shortly acuminate apex; the edges entire; the base broad, rounded, very slightly emarginate, 3-nerved; primary lateral nerves 5 pairs, prominent on the lower surface which is pretty uniformly hispid-pilose; upper surface sub-scabrid, with some scattered stiff hairs, especially on the midrib and nerves, the midrib minutely tomentose; length of blade from 6 to 9 in.; petiole about ·3 in., tomentose; stipules ovate-acuminate, tomentose externally, glabrous internally, ·6 in. long. Receptacles pedunculate, solitary or in pairs, axillary, sub-globose, with conical umbonate apex and broad concave base; the sides rough, minutely tuberculate, and deciduously fulvous-pubescent or tomentose; the umbilicus minute, closed by stiff yellow hairs and surrounded at some distance by a wavy annulus; basal bracts none; diameter about 1·2 in.; peduncle stout, clothed, like the receptacle, with deciduous tomentum, ·3 in. long. Male flowers large, numerous, pedicellate, occupying the upper half of the receptacles with the gall flowers; anthers 2, long, linear-apiculate; the perianth of 4 distinct pieces, 2 of which are as long as the stamens and 2 much shorter. Gall flowers smaller and on shorter pedicels than the males; the perianth of 4 distinct pieces; the achene globular; style terminal; stigma slightly dilated. Fertile female flowers not known.

New Guinea—*Beccari* (Herb. Becc. P. P. No. 937).

Plate 198.—Leafy branch of *F. Odoardi*, King. 1, receptacle; 2, apex of the same; 3, stipules—*all of natural size;* 4, male flower; 5, gall flower: *enlarged.*

184. Ficus leucoptera, *Miq. Pl. Jungh.* 52; *Miq. Fl. Ind. Bat.* i. *pt.* 2. 295; *Ann. Mus. Lugd. Bat.* iii. 270, 290.

Young branches minutely adpressed-hispid, ultimately glabrous. Leaves elliptic, narrowed to either end, thickly membranous; upper surface scabrid from the presence of minute, stiff, broad-based hairs which disappear in old leaves and leave the upper surface nearly glabrous except on the midrib and nerves which are always minutely adpressed-hispid; lower surface pale, with very distinct reticulations, covered everywhere with soft, short, white hairs, except the midrib and nerves which are adpressed fulvous-sericeous; apex acute; base narrowed or rounded, 3- to 5-nerved, biglandular; edges entire; primary lateral nerves about 3 pairs, prominent, especially below; length of blade 5 to 7 in.; petioles 1·5 in. to 2·3 in. long, glabrous or nearly so; stipules ·5 in. long, fulvous-sericeous externally; young receptacles (ripe are unknown) axillary, solitary, obovoid-globose, the apical scales forming a small umbilicus; villous or pubescent, not ridged; basal bracts 3, spreading, pubescent; peduncle pubescent, ·2 to ·4 in. long. Male and gall flowers not seen. Fertile female flowers pedicellate, with perianth of 4 pieces; ovary ovate-oblong; style lateral; stigma cylindric; interior of receptacle with a few hairs.

Java, 3,000 to 4,000 ft.,—*Junghuhn;* Borneo,—*Beccari* (P. B. 962).

The specimens of this from Java in the Herbaria at Utrecht and Leiden are poor. Beccari's Bornean specimens are excellent, and from one of them the foregoing description has been drawn up. The species is closely allied to *F. fulva*, Reinw.

Plate 199.—Branch of *F. leucoptera*, Miq., with young receptacles—*of natural size;* 2, lateral view of receptacle; 3, basal view to show the three basal bracts; 4, a single basal bract, detached; 1, stipule (*Nos.* 1 *to* 4 *are twice the natural size*); 5, fertile female flower: *much enlarged.*

185. Ficus pyriformis, *Hook. and Arn. Voyage Beechey.* 216; *Miq. in Lond. Journ. Bot.* vii. 437. tab. 6. fig. A; *in Ann. Mus. Lugd. Bat.* iii. 281, 294; *Benth. Fl. Hong-Kong* 328.—*F. Millettii*, Miq. in Lond. Journ. Bot. vii. 438; Maximowicz in Bull. Acad. St. Petersb. xi. 336.—*F. Abelii*, Miq. Ann. Mus. Lugd. Bat. iii. 281, 295.—*F. subpyriformis*, Miq. in Ann. Mus. Lugd. Bat. iii. 229, 294; Kurz. For. Flora Brit. Burmah ii. 456.—*F. Finlaysoniana*, Wall. Cat. 4553.—*F. ischnopoda*, Miq. in Ann. Mus. Lugd. Bat. iii, 229, 294; Kurz For. Flora Brit. Burmah ii. 456.

A shrub. The young parts pubescent; leaves from oblong-lanceolate to narrowly lanceolate; the apex obtusely acuminate; the edges entire and slightly revolute when dry; base acute, 3-nerved; main primary nerves 5 to 10 pairs; the reticulations minute and rather distinct on the lower surface, all of which is glabrous, pubescent, or sparsely hispid; upper surface asperulous, glabrescent, or glabrous; length of blade 1·75 to 4 in.; petioles ·25 to 5 in. long; stipules subulate, glabrous, ·2 to ·4 in. long. Receptacles on peduncles of varying length, axillary, solitary, pyriform; the apex more or less umbonate; contracted at the base into a stalk at the union of which with the peduncle proper are 3 triangular bracts; glabrescent, puberulous, or shortly hispid; when ripe from ·4 in. to ·75 in. across; receptacles containing the male and gall flowers larger than those containing the fertile female flowers. Male flowers occupying the upper fifth of the receptacle, shortly pedicellate; the perianth of 3 distinct pieces; stamens 2, the anthers ovate. Gall flowers on longer pedicels than the males; the perianth of 4 pieces; ovary globular, smooth, with a short lateral style and dilated tubular stigma. Fertile female flowers on separate receptacles (and on separate plants); the fertile achene reniform, minutely tubercled; the style sub-terminal, long, thin; the perianth of 5 distinct pieces.

Assam, Khasi Hills, Burmah; Malayan Peninsula; Hong-Kong, and the neighbouring mainland of China. This widely-spread plant assumes, as might be expected, a variety of forms to which specific names have been given. I reduce these to varieties, of which four may be distinguished as follows:—

1. FORMA TYPICA. Leaves lanceolate, glabrous but asperulous, minutely punctate on lower surface; receptacles smooth.—*F. pyriformis*, Hook. and Arn. Voyage Beechey. 216.—China.
2. VAR. ABELII. Leaves as in var. 1, but shortly and sparsely hispid on the lower surface; receptacles hispid-pubescent.—*F. pyriformis*, Miq. *F. Abelii*, Miq.—China.
3. VAR. SUB-PYRIFORMIS. Leaves elongate, narrowly lanceolate, pubescent underneath; primary lateral nerves about 10 pairs; receptacles and peduncles pubescent.—*F. sub-pyriformis*, Miq.—*F. Finlaysoniana*, Wall. Cat. 4553. Assam, Khasia, and Burmah.
4. VAR. ISCHNOPODA. Leaves as in *sub-pyriformis*, Miq., but glabrous; receptacle glabrous; the peduncles much elongate.—*F. ischnopoda*, Miq.—Khasia, Burmah, Malaya.

These varieties are connected by intermediate forms, and in my opinion they all are but modifications of *F. erecta*, Thunbg.

PLATE 200.—*F. pyriformis*, Hook. and Arn. Branch with mature receptacles containing male and gall flowers. A: var. *Abelii.* 1, receptacle containing female flowers; 2, apex of the same; 3, basal bracts—*all of natural size;* 4, male flower; 5, gall flower; 6, fertile female flower: *enlarged.*

PLATE 201.—*F. pyriformis*, Hook. and Arn. B.: var. *sub-pyriformis.* Branch with immature receptacles. C: var. *ischnopoda.* Branch with mature receptacles. 1, receptacle; 2, apex of the same; 3, stipules—*all of natural size.*

186. FICUS MOTTLEYANA, *Miq. in Ann. Mus. Lugd. Bat.* iii. 228, 294.

A shrub? all parts quite glabrous. Leaves shortly petiolate, sub-coriaceous, narrowly oblong or lanceolate, sometimes oblanceolate; the apex acute; the edges waved, thickened, revolute; the base very gradually narrowed to the short petiole, biglandular, faintly 3-nerved;

lateral primary nerves only about 4 pairs, the secondary nerves and reticulations almost equalling them, all pale coloured and prominent below; length of blade 3 to 5 in.; petiole thick, ·25 in. long; stipules broad, acuminate, ·25 in. long. Receptacles in pairs, axillary, shortly pedunculate, elongate-ovoid, with a prominent umbilicus; sometimes constricted towards the base, ·3 in. across, smooth; basal bracts 3, broadly ovate; peduncles about ·25 in. long. Male flowers occupying the upper half of the receptacles, the lower half being occupied by galls. Male flowers nearly sessile; the perianth of 3 distinct pieces; stamens 2; the anthers broadly ovate; the filaments short. Gall flowers pedicellate; the perianth like that of the male; the achene, when young, obliquely ovoid-rhomboid, smooth, crustaceous; the style short; stigma dilated; when old narrowly reniform (like a bean).

Borneo,—*Motley*, *De Vriese*, *Teysmann.*

I have seen no fertile female flowers in this so-called species, which is possibly only a form of *diversifolia*, Bl.

The affinities of this are, in my opinion, with *diversifolia* and *lutescens*, rather than with *pyriformis* near which Miquel places it.

PLATE 202.—A and B,—fruiting-branches of *F. Motleyana*, Miq., showing mature receptacles of two different forms. 1, leaf of a variety with oblanceolate leaves; 2, apex of a receptacle; 3, base of the same; 4, stipules—*all of natural size;* 5, male flower; 6, gall flower (*young*) (*Nos.* 5 *and* 6 *are from twig A*); 7, gall achene (*old*) from twig B.

187. FICUS CHARTACEA, *Wall. Cat.* 4580.—*F. torulosa*, Wall. Cat. 4550.—*F. Lamponga*, Miq. var. *chartacea*, Kurz For. Flora Brit. Burmah ii. 451.

A shrub. The leaves in bud, and the apices of the young petioles adpressed-pubescent; the adult-parts all perfectly glabrous. Leaves membranous, petiolate, lanceolate, oblanceolate or ovate-lanceolate; narrowed below to the cuneate, 3-nerved base; the apex acuminate or cuspidate; the edges quite entire; primary lateral nerves 3 to 5 pairs; secondary nervation subhorizontal; reticulations minute, distinct on the lower surface; both surfaces quite glabrous, the lower often slightly asperulous; petioles slender, ·6 to 1 in. long; stipules lanceolate, convolute, glabrous (pubescent when very young), from ·2 to ·4 in. long.

Receptacles sessile or very shortly pedunculate, in pairs in the axils of the leaves or of the scars of fallen leaves, often crowded, globular; umbonate when young; when ripe smooth, yellow, and about ·25 in. across; basal bracts 3, minute; peduncles when present about ·1 in. long, glabrous. Male flowers numerous near the mouth of the receptacles containing gall flowers, sessile, clavate; the perianth of 3 spathulate distinct pieces; stamens 2, the filaments very short. Gall flowers pedicellate; the perianth of 4 narrow lanceolate pieces; ovary smooth, sub-globular, with short lateral style and tubular stigma. Fertile female flowers in separate receptacles, pedicellate; the perianth of 3 distinct spathulate pieces; the achene ovoid, rugose, with a thickened margin; style sub-terminal; stigma cylindric.

Burmah and Malayan Peninsula. Rather a common bush near the coast.

A small broad-leaved form of this was issued as a species by Wallich under the name of *torulosa*. It may be kept up as a variety.

VAR. TORULOSA. Leaves from 2 to 3 in. long, more obovate and less oblanceolate than in the type; receptacles quite sessile.—*F. torulosa*, Wall. Cat. 4550. Perak,—King's Collector Nos. 2459, 5669, 6270.

This comes very near *F. Silhetensis,* from which it is best distinguished by having perfectly glabrous, non-punctate leaves; glabrous, nearly or quite sessile receptacles; and sessile male flowers; and, like *Silhetensis,* it may possibly be only a local form of the Chinese *F. erecta,* Thunbg.

PLATE 203.—A: fruiting-branch of *F. chartacea,* Wall. B & C: fruiting branches of var. *torulosa.* 1,1, lateral view of a receptacle; 2,2, apex of the same; 3,3, stipules—*all of natural sixe;* 4, male flower; 5, gall flower from the same receptacle; 6, fertile female flower from another receptacle: *enlarged.*

188. FICUS OLEÆFOLIA, *nov. spec.*

A scandent, epiphytal shrub, all its parts quite glabrous. Leaves shortly petiolate, sub-coriaceous, lanceolate, much narrowed to either end; the apex bluntly and shortly acuminate; the edges entire, recurved; the base obscurely 3-nerved, biglandular; lateral primary nerves 6 to 8 pairs, dark coloured beneath in young leaves, but indistinct in old leaves; the midrib broad and prominent; the reticulations open, and in the young state distinct on the lower surface, which is of a dull pale colour when dry, indistinctly and minutely tuberculate; length of blade 1 in. to nearly 2 in. (3 in. in var. *major*); petiole ·15 to 2 in. long; stipules linear-lanceolate, much convolute, glabrous or puberulous, ·3 in. long (·5 in. in var. *major*). Receptacles numerous, shortly pedunculate, in pairs, axillary, globular (ovoid in var. *major*), with prominent umbilicus; smooth when ripe, ·15 in. across; basal bracts 3, ovate-triangular, united at the base, ciliate. Male flowers sub-sessile; the perianth of 3 or 4 pieces; anthers 2, broadly ovate—one of them sub-sessile, the other with a filament. Gall flowers sub-sessile; the perianth of about 4 distinct pieces; the achene smooth, many-angled; style minute, sub-terminal.

Western Sumatra, on Mount Singalan, at an elevation of about 5,000 ft.,—*Beccari* (Herb. Beccari; P. Sumatranæ, No. 82).

A species with leaves a good deal like those of *Olea cuspidata,* Wall., but smaller.

VAR. MAJOR. The leaves larger than in the typical form, and more acuminate; the stipules longer and the receptacles more ovoid.—*Herb. Beccari; P. Sumatranæ No.* 312.

PLATE 204B.—A branch of *F. oleæfolia,* King, with mature receptacles—*of natural size.* 1, stipule; 2 & 3, receptacles; 4, basal bract; 5, male flower; 6, the 2 stamens of a male flower; 7, the four-leaved perianth of the same; 8, gall flower showing its many-angled achene. *Nos.* 1 *to* 8 *are much enlarged.*

189. FICUS PAUPER, *nov. spec.*

Leaves membranous, petiolate, slightly inequilateral, lanceolate or ovate-lanceolate and narrowed from below the middle to the obscurely 3 nerved base; the apex acute; the edges entire; lateral primary nerves about 6 to 8 pairs, diverging from the midrib at rather a wide angle and, like the midrib, prominent beneath; midrib with a few scattered adpressed hairs; upper surface glabrous; length of blade 1·5 in. to 2 in.; petiole ·3 in. long, adpressed-hispid beneath; stipules persistent, scarious, deciduously sericeous, ovate-acuminate, ·35 in.

long. Receptacles pedunculate, in pairs, axillary when young, globose, slightly constricted at the base, sparsely adpressed hispid; the umbilicus large and prominent; basal bracts 3, broadly ovate, blunt, puberulous; peduncle ·1 in. long, densely puberulous; ripe receptacles unknown. Male flowers with 2 nearly sessile anthers and a perianth of 3 distinct pieces. Gall flowers with sub-globular, smooth ovary; short, thick, lateral style, and truncate stigma; receptacles bearing fertile female flowers unknown.

New Guinea,—Fly River No. 49, D'Albertis.

This is apparently a shrub or small tree. It approaches *F. erecta*, Thunbg., but is distinguished from that species by its smaller leaves, which have more numerous and more horizontal primary lateral nerves; and by its adpressed-strigose, much smaller receptacles.

PLATE 204A.—Branch of *F. pauper*, King, with mature receptacles—*of natural size.* 1, stipule; 2 & 3, receptacles; 4, a basal bract; 5 & 6, male flowers; 7, gall flower (young). *Nos.* 1 *to* 7 *are much enlarged.*

190. FICUS SORONENSIS, *nov. spec.*

The young parts puberulous. Leaves membranous, tapering to either end, narrowly elliptic, or ovate-lanceolate; the apex shortly acuminate; the edges entire; the base acute, 3-nerved; primary lateral nerves 3 or 4 pairs, not very prominent; under surface sub-scabrid from numerous minute, black tubercles; the reticulations open and rather distinct; length of blade 2 to 4 in.; petioles ·3 in. long; stipules lanceolate, scarious, puberulous, ·4 in. long, persistent. Receptacles in pairs from the axils of the leaves or from the scars of fallen leaves, pedunculate, globular, sub-scabrid, minutely tuberculate; the umbilicus prominent; basal bracts none, but a few verrucose bracts on the sides of the receptacles; peduncles with one or two bracteoles, ·15 in. long. Fertile female flowers sessile or pedicellate; perianth of 3 or 4 pieces; achene sub-trigonous, slightly hairy near the apex; style lateral; stigma cylindrical, truncate. Male and gall flowers not seen.

New Guinea,—*Soron.* Beccari's Herb., Pl. Papuanæ, No. 458.

This comes near some of the forms of *F. erecta*, Thunbg., but differs in having the under surface of the leaves more tuberculate, and in having much smaller receptacles. It is not, however, far removed from *erecta.*

PLATE 205A.—*F. Soronensis*, King. Fruiting branch with mature receptacles—*of natural size.* 1, stipule; 2, receptacle—*magnified three times;* 3, fertile female flower: *much enlarged.*

All three kinds of flowers in the same receptacle (as in Urostigma).

191. FICUS NEMORALIS, *Wall. Cat.* 4517; *Miq. in Lond. Journ. Bot.* vii. 453; *Ann. Mus. Lugd. Bat.* iii. 295 (excl. syn. *F. verrucosa*); *Brandis For. Flora* 424.—*F. gemella*, Wall. Cat. 4516; Miq. Lond. Journ. Bot. vii. 454; Ann. Mus. Lugd. Bat iii. 295.—*F. densa*, Miq. l.c. 453.—*F. Fieldingii*, Miq. Lond. Journ. Bot. vii. 439; Ann. Mus. Lugd. Bat. iii. 280, 294.—

F. trilepis, Miq. in Ann. Mus. Lugd. Bat. iii. 228, 294, Wall. Cat.—*F. caudata*, Wall. Cat. 4494B.—*F. binata*, Wall. Cat. 4554.—*F. clavifructus*, King MSS.

A small glabrous tree or bush. Leaves membranous, petiolate, sometimes slightly inequilateral, lanceolate, ovate-lanceolate or elliptic, rarely oblanceolate, gradually narrowed upwards to a more or less lengthened sharp acumen; edges entire, not revolute; base cuneate or much narrowed, rarely rounded, 3-nerved; lateral primary nerves 7 to 12 or even 14 pairs, rather horizontal, prominent, and, as well as the minute distinct reticulations, dark coloured on the lower surface; length of blade 3 to 5·5 in.; petioles ·5 in. to 1 in. and (in some luxuriant specimens) nearly 2 in. long; stipules lanceolate, convolute, glabrous, ·4 to ·6 in. long. Receptacles glabrous, sessile, or shortly pedunculate, from the axils of leaves or of the scars of fallen leaves, sub-globular or ellipsoid or truncate-ellipsoid when young, clavate when mature, about ·3 in. across; umbilicus always rather prominent; basal bracts 3, broad, united; peduncle absent or from ·15 in. to ·2 in. long. Male flowers present in both sets of receptacles, pedicellate, most numerous near the mouth, but occasionally scattered in the receptacles containing gall flowers, few and confined to the neighbourhood of the mouth in the receptacles containing fertile female flowers, di- or tri-androus. Female and gall flowers with similar perianth of 3 fleshy, ovate-lanceolate pieces; the gall ovary ovoid, crustaceous; achene of fertile female rotund, minutely wrinkled; its style longer and more lateral than that of the gall flower.

On the lower slopes of the outer ranges of the Himalaya from Hazara to Bhotan, the Khasia and other hill ranges of Assam, at elevations of from 1,500 to 6,500 ft.

Rather variable, but not more so than might be expected in a species of such wide distribution. The forms may be divided into two series, according as the receptacles contain a larger or smaller proportion of fertile female flowers:—

SERIES 1.—*Receptacles ovoid or clavate; male flowers few; galls few or absent; fertile females numerous.*

VAR. 1. FORMA TYPICA. Leaves elliptic or ovate-lanceolate, with rather a broad base; receptacles shortly pedunculate, ovoid; fertile female flowers rather numerous. Central and Eastern Himalaya, Assam.

VAR. 2. TRILEPIS. Receptacles ellipsoid, truncate when young, clavate when mature; containing mainly fertile females. Central and Eastern Himalaya. *F. binata*, Wall.; *F. trilepis*, Miq.; *F. clavifructus*, King MSS. In the receptacles of this variety I have not found many fertile male flowers; rudimentary male flowers without anthers are, however, rather numerous near the mouth, while gall flowers are very few in number. The above two varieties are thus practically the female forms of the species.

SERIES II.—*Receptacles sub-globular; male and gall flowers numerous; fertile female flowers few or absent.*

VAR. 3. GEMELLA. The leaves narrower than in the typical form; the receptacles sessile. Distribution the smae as in var. 1.—*F. gemella*, Wall.

VAR. 4. FIELDINGII. Leaves narrow, much acuminate; receptacles shortly pedunculate. Western Himalaya, from 1,500 to 3,000 ft.; Eastern Himalaya up to even 8,000 ft.—*F. Fieldingii*, Miq.—*F. densa*, Wall.

By the arrangement of its flowers this species forms a connecting link between *Eusyce* and *Urostigma*.

PLATE 206.—*F. nemoralis*, Wall. Fruiting-branches of four varieties:—

A. *Forma typica.*
B. var. *trilepis* with young receptacles.
C. ,, with mature receptacles.
D. var. *gemella.*
E. var. *Fieldingii.*

1,1, a receptacle; 2,2, apex of same; 3,3, stipules—*all of natural size;* 4, male triandrous flower; 5, fertile female flower; 6, gall flower. Nos. 4 and 5 are from a receptacle of D, and No. 6 is from a receptacle of C: *all enlarged.*

192. FICUS LEPIDOSA, *Wall. Cat.* 4541; *Kurz For. Flora Brit. Burmah* ii. 450.—*F. Martabanica*, Wall. Cat. 4551.—*F. lamponga*, Miq. Fl. Ind. Bat. Suppl. 174, 430; Miq. in Ann. Mus. Lugd. Bat. iii. 294.—*F. lamponga*, Miq. var. 1; Kurz For. Flora Brit. Burmah ii. 451.

A small tree. The young branches pubescent. Leaves membranous, petiolate, ovate-oblong to obovate-elliptic or (in var. *Martabanica*) lanceolate; apex acute, shortly and narrowly cuspidate; edges entire; base rounded, blunt, or sub-acute (never cordate), 3-nerved (sometimes with 2 minute additional nerves); lateral primary nerves 7 to 8 pairs, prominent below, joining the midrib at an acute angle; intermediate nerves nearly straight; reticulations minute, distinct; under surface pale gray or almost white when dry, adpressed-pubescent, especially on the midrib and nerves; upper surface hard and slightly harsh to the touch; glabrous, with a few scattered, adpressed, short hairs and pubescent midrib; length 4 to 7 in.; petioles ·6 to 1·5 in. long, pubescent; stipules lanceolate, acuminate, glabrous except along the midrib externally, about ·6 in. long. Receptacles pedunculate, in pairs from the axils of the leaves or from the scars of fallen leaves, ellipsoid, globular, or sub-pyriform; when young prominently mammillate, shortly pubescent, with 3, ovate-acute, spreading basal bracts; when ripe orange red and from ·5 to ·6 in. across; peduncle ·2 to ·5 in. long, pubescent. Male flowers (only in the ellipsoid receptacles and associated with gall flowers) nearly sessile; the perianth of 4 pieces; stamen 1; anther single, broadly ovate, the filament adnate; gall ovary globular, smooth, with lateral style and tubular stigma. Perfect females (only in globular or sub-pyriform receptacles) sessile; the perianth of 4 or 5 leaves; achene oblong, oblique, rugose; style sub-terminal, not hairy; stigma cylindric. Interior of receptacle with a few white hairs, amongst which the flowers are embedded.

VAR. MARTABANICA. Leaves elongate-lanceolate, acuminate. *F. martabanica*, Wall. Bhotan Dooars (at the base of the Bhotan Himalaya), Assam, Chittagong Hill Tracts, Burmah.

This species has been collected in Burmah only by Wallich's collectors and by the late Mr. Kurz; and in the Bhotan Dooars only by Mr. J. S. Gamble, of the Indian Forest

Department. In the Chittagong Hill Tracts it is not uncommon. There are no specimens of this in the Herbaria at Leiden or Utrecht, and Miquel probably never saw a specimen of it. But in *Ann. Mus. Lugd. Bat.* iii. 289 he reduces it, on the authority of Kurz, to *F. diversifolia,* which does not in the least resemble the Wallichian type sheet of this. No doubt the error arose from some misplacement of tickets.

This species is closely allied to *F. glandulifera,* Wall. Cat. 4481, which is the same as *F. aurantiaca,* Miq.; *F. Martabanica,* Wall. Cat. 4551, is also only a narrow-leaved form of this. The species *F. lamponga* was founded by Miquel on a fruitless twig of this in the Herbarium at Utrecht. Kurz (*For. Flora Brit. Burmah* ii. 451) assumes that Wallich's species *F. chartacea* (*Cat.* 4580) is the same as *F. lamponga*, Miq., and he reduces *F. chartacea,* Wall., as a variety of *lamponga,* Miq. But the reduction is quite wrong, for the leaves of Miquel's fragmentary type of *lamponga* have about 10 pairs of primary lateral nerves, and they, as well as the midrib, are adpressed-pilose below; whereas in *chartacea,* Wall., the primary nerves are but 4 pairs and, like the midrib, glabrous below.

PLATE 207.—Twig of *F. lepidosa,* Wall., with sub-globular receptacles containing fertile female flowers. 1, leaf with narrowed base (*from another specimen*); 2, ellipsoid receptacle containing male and gall flowers; 3, base of a sub-globular receptacle; 4, apex of the same—*all of natural size;* 5, male flower; 6, gall flower (*from the same ellipsoid receptacle*); 7, fertile female flower (*from a sub-globular receptacle*): *enlarged.*

Neomorphe.—*Flowers unisexual; male and gall flowers in one set of receptacles: fertile female flowers in a distinct set of receptacles; male flowers with 2 stamens (sometimes 1 in Nos. 195and 197 and 3 in No. 195), the perianth inflated, of 3 or 4 membranous pieces, fertile female flowers smaller than the male or gall flowers; receptacles often very large, in fascicles from tubercles on the stem and larger branches; trees, rarely scandent shrubs, never epiphytal: (in Nos. 201 and 205 all three kinds of flowers are found in the same receptacle, thus resembling Urostigma).*

- *Scandent.*
  - *Leaves membranous, their apices acuminate* . . . . 193. *F. macrocarpa.*
  - *Leaves sub-coriaceous, their apices shortly and suddenly cuspidate* . . . 194. *F. guttata.*
- *Arboreous or shrubby.*
  - *Leaves large, broadly ovate, their bases deeply cordate.*
    - Edges of leaves entire; receptacles obovoid, 1·25 inches in diameter; perianth of fertile female flower of 5 distinct pieces . 195. *F. nodosa.*
    - Edges of leaves entire or dentate-serrate; receptacles turbinate, 2 inches in diameter; perianth of fertile female flower gamophyllous below, 2- or 3- partite above . . . . 196. *F. Roxburghii.*
  - *Leaves ovate-elliptic, their bases slightly cordate; perianth of fertile female flower gamophyllous, 4- or 5-toothed* . . . . 197. *F. variegata.*
  - *Leaves ovate-elliptic, their bases not cordate.*
    - Receptacles 2 inches or more in diameter, on many-bracted, shortened branches . . . . 198. *F. grandis.*
    - Receptacles about 1 inch in diameter, in short, ebracteate fascicles.
      - Leaves coarsely and remotely serrate; lateral primary nerves 4 or 5 pairs . . . . 199. *F. pomifera.*
      - Leaves minutely dentate or sub-entire; lateral primary nerves 7 pairs . . . . 200. *F. D'Albertisii.*
    - Receptacles ·5 inch in diameter; lateral primary nerves 3 pair . 201. *F. sycomoroides.*

Leaves ovate, oval, or oblong, about twice as long as broad; the edges entire.

Receptacles pedunculate, leaves membranous . . . . 202. *F. glomerata.*
Receptacles almost sessile, leaves coriaceous . . . . 203. *F. Henrici.*

Leaves lanceolate, three or four times as long as broad.

Leaves inequilateral, their apices suddenly acuminate.

Receptacles about 1 inch in diameter; smooth . . . . . 204. *F. Clarkei.*
Receptacles ·35 inch in diameter, verrucose, scabrid . . . 205. *F. Aruensis.*

Leaves equilateral, gradually narrowed to the apex.

Leaves coriaceous . . . . 203. *F. Henrici.*
Leaves membranous; receptacles smooth, sub-globular; the apex not depressed . . . . 206. *F. acidula.*
Receptacles verrucose; the apex much depressed . . . . 207. *F. lanceolata.*

Scandent.

193. Ficus macrocarpa, *Wight MSS.*—*Pogonotrophe macrocarpa*, Miq., Wight's Icon 1965.

A scandent shrub. The young branches puberulous, but ultimately glabrous. Leaves membranous, long-petiolate, broadly ovate, sometimes inequilateral; the apex shortly acuminate; edges entire; base rounded or very slightly cordate, 3- to 5-nerved; primary lateral nerves about 3 pairs and, like the minute reticulations, rather prominent; under surface pubescent, sub glabrous; upper surface glabrous; length of blade about 5 in.; petioles 2 to 2·5 in. long; stipules lanceolate, puberulous, or glabrous, about ·35 in. long. Receptacles in fascicles from the naked stem far below the leaves, globose, pubescent, or nearly glabrous; when ripe spotted and from 1 in. to (*fide* Wight) 2½ in. across; basal bracts absent; peduncles about ·35 in. long, with several minor bracts at their base. Male and gall flowers not found. Fertile female flowers sessile or pedicellate; the perianth of 6 free pieces; ovary sub-ovoid; style sub-terminal, as long as the ovary, hairy, straight, or curved; stigma bilobed.

Nilgiri Hills, Southern India, at 5,000 ft.

Mr. Gamble's specimens of this species (*Herb. Prop. Gamble* 11500) are the only examples that I have seen. They agree well with Wight's figure. The species evidently approaches *F. guttata*, Wight, and is possibly only a form of it. There are a few external differences, and the female flowers differ somewhat from those of the only receptacle of *F. guttata*, Wight which I have been able to get, and these females are in such a young state that it is only from the absence of male florets in the receptacle with them that I conclude that they are fertile. Until completer material of the two species is obtained it is impossible to determine their relation to each other.

Miquel (*Ann. Mus. Lugd. Bat.* iii. 278) considered Wight's Icon 1965 as referable to *F. vagans*, Roxb. But the receptacles of *vagans* are described by Roxburgh as axillary and of the size of a nutmeg; whereas those of this plant are never axillary, but always in fascicles on the stem far below the leaf region, and often (*fide* Wight) as large as an orange.

PLATE 208.—*F. macrocarpa*, Wight, leaf twig. 1, part of a fascicle of receptacles from the stem below the leaves; 2, apex, and 3, base of a receptacle; 4, stipules—*all of natural size;* 5, 6, & 7, pedicellate and sessile fertile female flowers; 8, perianth of pedicellate flower; 9, ovary: *enlarged.*

194. FICUS GUTTATA, *Wight.*—*Covellia guttata*, Wight Ic. 1966.

A scandent shrub. The young branches shortly tomentose, ultimately becoming glabrescent or glabrous. Leaves petiolate, sub-coriaceous, broadly ovate, with shortly cuspidate apex, entire edges, and broad, rounded, or slightly cordate, 3- to 5-nerved base; lateral primary nerves about 3 pairs; the intermediate nerves and the minute reticulations rather distinct on the under surface which is softly and minutely villous, sometimes in old leaves glabrescent; upper surface with a few scattered, minute hairs, or glabrous; length of blade 4 or 5 in.; petioles ·65 in. to 1 in. long and, like the leaves, villous or glabrescent; stipules ovate-lanceolate, about ·6 in. long, tomentose externally with glabrous edges. Receptacles short-peduncled, in fascicles from tubercles on the branches or main stem; basal bracts 3, broadly ovate; when young slightly umbonate; when mature sub-globular, pubescent, blotched, from 1 in. to 1·25 in. in diameter. Fertile (?) female flowers sessile; the perianth of 6 pieces; style short, thick; stigma much dilated, widely infundibuliform.

Nilgiri and Pulney Hills in Southern India.

Male flowers have not been found in the only receptacle that I have been able to get; the flowers present appear to be all fertile female. The probable relation of this to *macrocarpa* is discussed under that species.

This species is badly represented in collections. Besides a specimen from Wight's Herbarium, I have only seen two specimens of it (collected by Colonel Beddome and Mr. J. Sykes Gamble), and they agree well with Wight's figure; only one of them, however, has a receptacle, and that is immature.

PLATE 209.—Apex of branch of *F. guttata.* 1, fascicle of nearly mature receptacles from the stem; 2, apex of receptacle; 3, base of same; 4, stipules—*all of natural size;* 5, group of fertile (?) female flowers attached to a piece of the receptacle; 6, fertile female flower showing the 6 perianth leaves, ovary, style, and stigma; 7 female flower, unexpanded: *all enlarged.*

Arboreous or Shrubby.

195. FICUS NODOSA, *Teysm. and Binn. in Nat. Tijds. Ned. Ind.* xxix. 245; *Miq. in Ann. Mus. Lugd. Bat.* iii. 295.

A tree, 60 to 80 ft high, with whitish smooth bark. Young parts puberulous, ultimately all parts quite glabrous. Leaves broadly ovate or ovate-rotund with acuminate apex, entire edges, and more or less deeply cordate, 5- , rarely 7-nerved base; lateral nerves 3 to 4 pairs, thin, prominent, and coloured on the under surface, as also are the rather distant, sub-transverse, secondary nerves; reticulations minute, rather indistinct; both surfaces glabrous; length from 8 to 10 in.; petioles 1 to 2 in. long; stipules broadly ovate, acute, sericeous, about ·4 in. long. Receptacles shortly pedunculate, on rather elongated, woody panicles from the stem; obovoid, nearly smooth, with rather prominent umbilicus, and 3 basal bracts, about 1·25 in. across when ripe; peduncles ·5 in. or ·6 in. long. Male flowers numerous and forming a zone near the mouth of the receptacles containing gall flowers, sessile, as broad as long; the perianth of 3 or 4 inflated, loose, membranous pieces, completely enveloping the 2 broadly ovate, nearly sessile, anthers. Mature gall flowers not seen. Fertile female flowers shortly pedicellate; the perianth of 5 linear pieces; achene rhomboid-ovoid, narrowed to the base; its surface dull, dark in colour, and prominently tuberculate; the style sub-terminal, elongate, rather stout; the stigma cylindric.

Amboina and the Molucca Islands.

When dry, the leaves of this at once suggest *F. Roxburghii* or *F. pomifera;* but I have seen this growing (in the Botanic Garden at Buitenzorg), and in the living state it appears sufficiently distinct even in external characters, while the flowers are quite different.

Plate 210.—Leaf and branch of *F. nodosa,* Teysm. and Binn. 1, part of a panicle of immature receptacles; 2, mature receptacles; 3, stipules—*all of natural size;* 4, unexpanded male flower; 5, the anthers of a male flower, the perianth having being removed; 6, fertile female flower; 7, achene of a fertile female flower: *all enlarged.*

196. Ficus Roxburghii, *Wall. Cat.* 4508; *Miq. in Ann. Mus. Lugd. Bat.* iii. 296; *Brandis For. Flora* 422; *Kurz. For. Flora Brit. Burmah* ii. 460.—*F. macrophylla,* Roxb. Fl. Ind. iii. 556, (not of Desf); Wight Icon 673.—*F. scleroptera,* Griff. Ic. Pl. As. t. 558.—*Covellia macrophylla,* Miq. Lond. Journ. Bot. vii. 465.—*F. regia,* Miq. in Ann. Mus. Lugd. Bat. iii. 230, 297 (partly).

A tree, from 10 to 30 ft. high, with wide-spreading head; the young branches pubescent. Leaves thinly coriaceous, petiolate, broadly ovate to ovate-rotund, with very short, triangular, apical acumen, entire or serrate-dentate edges, and more or less deeply cordate, rarely rounded, 5- to 7-nerved base; primary lateral nerves about 3 or 4 pairs, prominent on both surfaces, as are the nearly parallel and almost straight intermediate nerves; reticulations not very distinct; under surface covered with short, soft pubescence; upper surface rigid, glabrescent, or glabrous, except the midrib and main nerves which are sometimes deciduously puberulous; length of blade from 5 in. to 15 in.; breadth 4·5 in. to 12 in.; petioles 1 in. to 4 in. long, or in young shoots as much as 8 in. long; stipules ovate-lanceolate, pubescent, ·6 in. to 1 in. long. Receptacles pedunculate, from shortened leafless branches borne on the larger branches or stem, turbinate or truncate-pyriform, with 8 to 12 indistinct vertical ridges; umbilicus large, and with numerous broad, tomentose scales; base sometimes constricted to a short stalk with 3 ovate to triangular, rather large, basal bracts; when young pubescent, when mature glabrescent, russet brown in colour, with a tinge of red or dull purplish, and spotted; about 2 in. or more across; peduncle proper ·75 in. to 1·75 in. long; pubescent. Male flowers near the apex of the receptacles containing the gall flowers, sessile; the perianth of 3 broad, imbricate, hyaline, inflated pieces; stamens 2, sometimes 3, and occasionally only 1; the anthers ovate; the filaments long, thick. Gall flowers pedicellate; the perianth gamophyllous below, 2- or 3-partite above, only partially covering the ovoid, smooth ovary; style sub-terminal, short; stigma dilated. Fertile female flowers sub-sessile or pedicellate; the perianth like that of the gall; achene minutely tubercular, viscid; the style long, curved, lateral, hairy; stigma cylindric.

Outer ranges of the Himalayas, from the Indus to Bhotan (but rare in the Western Himalaya); Assam and Khasi Hills; Chittagong and Burmese Hills—at elevations of from 1,000 to 5,000 ft.

The males of this are to be found perfect only in young receptacles in which the gall flowers are young. In receptacles from the gall flowers of which the Blastophaga has escaped, no trace even of the perianth of a male flower is to be found. This due to the fact that, in cutting their way out of the receptacle, the fully developed male *Blastophagas* cut through the male flowers which, as well as the scales, occlude the ostiole.

Miquel's species *F. regia* is made up partly of this and partly of *F. pomifera*, Wall., as I have satisfied myself by examination of his type specimens of *F. regia*. This species is closely allied to *variegata*, Bl.

PLATE 211.—*F. Roxburghii*, Wall. 1, mature receptacle; 2, apex of the same; 3, vertical section of the same—*of natural size;* 4, male flower; 5, an anther removed from male flower; 6, gall flower; 7, fertile female flower: *enlarged.*

FRONTISPIECE TO THIS VOLUME.—Base of the stem of a living tree in the Royal Botanic Garden, Calcutta, showing the crowded receptacles.—*Photographed by Dr. D. D. Cunningham.*

197. FICUS VARIEGATA, *Bl. Bijd.* 459; *Miq. Fl. Ind. Bat.* i. *pt.* 2. 320; *Ann. Mus. Lugd. Bat.* iii. 295.—*F. subracemosa*, Bl. Bijd. 469; Miq. Fl. Ind. Bat. l.c. 320; Choix de Plantes de Buitenzorg t. 13.—*F. racemifera*, Roxb. Fl. Ind. iii. 560; Wight Icon 639.—*Covellia racemifera*, Miq. Lond. Journ. Bot. vii. 465; Fl. Ind. Bat. i. pt. 2. 325.—*F. glomerata*, Hort. Buitenzorg (not of Roxb.)—*F. subopaca*, Miq. Fl. Ind. Bat. i. pt. 2. 320.—*F. cerifera*, Bl. in Ann. Sc. Nat. 4th ser. iii. 333. t. 14.—*F. ceriflua*, Jungh. Java i. 439.—*F. chlorocarpa*, Benth. Fl. Hong-Kong 330; Miq. in Ann. Mus. Lugd. Bat. iii. 296; Maxim. in Bull. Acad. St. Petersb. xi. 330.—*Sycomorus capensis* and *gummiflua*, Miq. Pl. Jungh. 64.—*Caprificus Amboinensis*, Rumph. Herb. Amb. 145. t. 93.

A spreading tree, 20 to 30 ft. high, with pale brown bark; the young shoots pubescent or glabrous. Leaves thinly coriaceous, petiolate, broadly ovate to ovate elliptic, acuminate; edges entire, sub-repand, or remotely denticulate; base rounded, emarginate, or cordate, 5-nerved, (2 of the nerves minute); lateral primary nerves 4 pairs, prominent; intermediate nerves transverse; reticulations minute; under surface in young leaves puberulous especially on the midrib and nerves, in adult leaves glabrous; upper surface glabrous; length 4 to 7 in.; petioles 1 to 2 in. long; stipules ovate-acuminate, glabrous, from ·5 to ·75 in. long. Receptacles pedunculate, in fascicles from tubercles (shortened abortive branches) on the trunk and larger branches, globose, slightly depressed at the apex, and sometimes with a short constriction at the base. When ripe smooth, red with white streaks and dots, and about ·1 in. across; peduncles ·75 in. to 2 in. long; base with 3 minute bracts, which are early deciduous and leave an annular scar. Male flowers near the mouth of the receptacle with the gall flowers; the perianth of 3 or 4 broad, loose, inflated pieces; anthers 2, broadly ovate, with short filaments which unite below into a common stalk. Gall flowers with a gamophyllous, tubular, 4- to 5-toothed perianth which envelopes the young pistil, but is much shorter than the mature ovary; the ovary ovoid, smooth; style short, lateral; the stigma large, funnel-shaped, with a very wide mouth. Fertile female flowers on separate and less numerous receptacles; the perianth (often difficult to find) of 3 or 4 narrow, lanceolate, thin, membranous pieces which are slightly united by their bases; the achene obovoid, minutely tuberculate; the style lateral, about as long as the achene; the stigma large, clavate.

Java, Sumatra, Penang, and the Malayan Archipelago and Hong Kong; generally up to elevations of 1,000 ft.; Assam, G. Mann; Chittagong, Lister.

Rather variable, especially as to the size and pubescence of the leaves. I have reduced as a variety of this *F. chlorocarpa*, Benth., from Hong-Kong, which, after careful comparison with the large suite of specimens of *variegata* in the Leiden and Utrecht collections, I do not find to differ specifically from this. Blume's *F. sub-racemosa* is a form with denticulate leaves, typical *variegata*, Bl., having entire leaves.

VAR. CHLOROCARPA. Leaves entire, rounded, or cordate at the base; the petioles 1·5 to 2·5 in. long; stipules ·4 to ·5 in. long; receptacles with constricted bases when young.—*F. chlorocarpa*, Benth., Hong-Kong.

The inspissated milky juice of this species forms the substance known in Malaya as *getah lahoe*, a gum resin allied to, but different from, caoutchouc or guttah percha, an interesting account of which by Bleekrode will be found in *Ann. Sc. Nat.* ser. iv. vol. iii. 330. This species appears to be occasionally cultivated on account of its fruit, which even in its wild condition is eatable.

PLATE 212.—*F. variegata*, Bl., a form with denticulate leaves and receptacles in all stages of maturity—*of natural size.* 1, unexpanded male flower; 2, stamens from a male flower; 3, gall flower; 4, perianth of the same; 5 & 6, achenes of the same at different ages; 7, fertile female flower: *enlarged.*

PLATE 213.—*F. variegata*, Bl., var. *chlorocarpa.* 1, young receptacles with much constricted bases; 2, nearly mature receptacles: *all of natural size.*

198. FICUS GRANDIS, *nov. spec.*

A tree. The young branches deciduously hispid-tomentose. Leaves large, membranous, petiolate, ovate-elliptic; the apex acute; edges irregularly and coarsely crenate-dentate; the base rounded, not cordate, 7-nerved (2 being minute); primary lateral nerves about 8 pairs, diverging from the midrib at rather an acute angle; the under surface finely reticulate and with numerous minute white papillæ, rather softly and minutely pubescent, especially on the midrib and nerves; upper surface scabrous from rather minute sub-adpressed hairs; length of blade 10 to 13 in.; petiole deeply channelled, pubescent, rather stout, 2·5 to 3·5 in. long; stipules ovate-acuminate, glabrous inside, puberulous outside, about 1·2 in. long. Receptacles on short, thick, multi-bracteate, tubercled, leafless branches from the main stem, on long, thin peduncles; depressed-globular or shortly pyriform; the surface slightly verrucose and scurfy, but without hairs; red when ripe, 1·4 in. long and 2 in. broad; the apex very broad, flat, slightly depressed; umbilical scales numerous, prominent; basal bracts large, ovate-triangular, acuminate, glabrous; peduncles nearly 3 in. long. Male flowers with 1 or 2 stamens; anther ovate, on a thick filament; perianth of 3 obcordate, inflated, hyaline pieces. Gall flowers pedicellate or sessile; the style short, sub-terminal; perianth absent. Fertile female flowesr unknown.

New Guinea,—*Sig. Beccari* (Herb. Becc. No. 601).

This vies with *F. Roxburghii* in having the largest leaves and receptacles of any Asiatic member of the genus *Ficus*.

Plate 214—*F. grandis*, King. 1, part of leafy branch; 2, receptacular branch with mature receptacles; 3, a stipule—*of natural size;* 4, an umbilical scale; 5 & 6, male flowers with 1 and 2 stamens; 7, the 3 pieces of the male perianth separated; 8, pedicellate gall flower: *enlarged.*

199. Ficus pomifera, *Wall. Cat.* 4547.—*F. Hamiltoniana*, Wall. 4545 A. ("*F. polycarpa*, Herb. Ham. non Roxb.").—*F. oligodon*, Miq. in Ann. Mus. Lugd. Bat. iii. 234, 297.—*F. regia*, Miq. in Ann. Mus. Lugd. Bat. iii. 230, 296 (partly); Kurz For. Flora Brit. Burmah ii. 458.

A tree, often 60 ft. high, with narrow (not spreading) head and smooth white bark; the young branches pubescent. Leaves lanceolate, elliptic, or sub-obovate-elliptic, with acute or sub-acuminate apex, coarsely, rather remotely and irregularly serrate edges and rounded or sub-cuneate (but never cordate), 3- to 5-nerved base; lateral primary nerves about 4 or 5 pairs; intermediate nerves sub-transverse, little curved, thin, but prominent below; reticulations rather lax, not very distinct; under surface minutely papillose, puberulous or glabrous; upper surface puberulous when young, ultimately glabrous; length 4·5 to 8 in.; petioles pubescent, 1·5 to 3·5 in. long; stipules ovate-lanceolate, pubescent or glabrous; ·5 to ·75 in. long. Receptacles long-pedunculate, on very much shortened, leafless branches or tubercles from the main stem and larger branches; sub-globular or sub-pyriform, often with depressed apex; pubescent, with 4 to 6 vertical grooves; sometimes verrucose; umbilicus rather prominent, with large, ovate-rounded, pubescent scales; basal bracts 3, ovate-acute; when ripe reddish in colour and 1 in. or rather more in diameter; peduncles 1 to 2·5 in. long, puberulous, or glabrous. Male flowers near the mouth of the receptacles containing gall flowers, not numerous, pedicellate, the pedicel often enveloped in a loose, membranous bracteole; the perianth of 3 large, loose, membranous pieces which completely enfold the anthers; anthers 2, curved, placed face to face. Gall flowers pedicellate; the perianth gamophyllous, 3-toothed, often completely enveloping the ovary; ovary ovoid, smooth; the style short, sub-terminal; stigma dilated. Fertile female flowers shortly pedicellate; the perianth like that of the gall flowers; achene minutely papillose; style long, lateral; stigma clavate.

Sikkim, Assam, Chittagong, Burmah, and Malayan Peninsula, at elevations of from 800 to 3,000 ft.

The broader leaved forms of this have a general resemblance to *F. Roxburghii*, but this is a tall tree with whitish grey bark, while *Roxburghii* is a low spreading tree with brown bark. This, moreover, differs from *Roxburghii* in having smaller, more glabrous leaves, not cordate at the base; smaller, more globular, and less hairy receptacles on larger, more slender, peduncles. The distribution of this species is further southward than that of *Roxburghii*.

This reaches no further northward than Sikkim. Sheet B. of Wallich's type of *Hamiltoniana* (No. 4545) is indeed doubtfully ascribed in his catalogue to Nepal; but I have no doubt it was so ascribed by mistake, for there is no other evidence whatever of the occurrence of this species in Nepal, and it is by no means common even in Sikkim.

Plate 215.—*F. pomifera*, Wall. 1, a tubercle from the stem bearing a fascicle of nearly mature receptacles; 2, base of a receptacle; 3 apex of the same; 4, vertical section of the same

—*all of natural size;* 5, male flower, unexpanded; 6, stamens of the same, the perianth having been removed; 7, gall flowers; 8, fertile female flower: *all enlarged.*

200. Ficus D'Albertisii, *nov. spec.*

A tree. The young branches with annular swellings at the nodes, and completely covered with closely-adpressed, minute, rusty pubescence. Leaves broadly ovate or elliptic, sometimes obovate-elliptic; the apex acute, shortly cuspidate; the edges minutely dentate or sub-entire; base rounded, emarginate or sub-cordate, sometimes unequal, 5-nerved; primary lateral nerves about 7 pairs; both surfaces closely covered with very minute, adpressed hairs; the upper surface slightly harsh, the lower soft; length of blade about 9 in.; petiole about 1·5 in., pubescent, swollen at its insertion on the stem; stipules ovate-lanceolate, acuminate, adpressed-pubescent externally, 1·5 in. long. Receptacles in small clusters from leafless ebracteate tubercles from the stem, pedunculate, pyriform, the sides with numerous vertical ridges and clothed with short, adpressed, apparently deciduous, scurfy pubescence; length 1·2 in, breadth 1 in.; the umbilicus large, closed by 5 broad, rounded scales; basal bracts 3, ovate, deciduous; peduncle stout, glabrous, ·75 in. long. Female flowers sessile or dedicellate, slightly rugose; the style long, terminal, hairy. Male and gall flowers unknown.

Fly River, New Guinea,—*D'Albertis* (no number). Sumatra,—*Beccari* (Herb. Becc. P. S. No. 736.)

Plate 216.—*F. D'Albertisii*, King. 1, apex of leafy branch; 2, branch with a fascicle of mature receptacles; 3, stipule—*all of natural size;* 4, piece of a leaf to show the minute hairs; 5, sessile and pedicellate fertile female flowers: *enlarged.*

201. Ficus sycomoroides, *Miq. in. Ann. Mus Lugd. Bat.* iii. 230, 295.

A spreading tree. The young branches pilose. Leaves petiolate, thinly coriaceous, ovate-elliptic; the apex shortly acute; the edges with a few irregular coarse teeth towards the apex, or entire; base rounded, 3-nerved; lateral primary nerves about 3 pairs, prominent below, as are the strong, transverse, secondary nerves; upper surface glabrous; the lower pubescent, especially on the nerves; length of blade 3 to 5 in.; petioles ·8 in. to 1 in. long; stipules lanceolate, acuminate, tomentose externally with glabrous edges, ·5 in long. Receptacles in short panicles from the stem and older branches, turbinate, much depressed, suddenly contracted into pedicels about ·5 in. long which are tribracteate at the base; when ripe about ·5 in. across, glabrous or puberulous, marked by about 8 vertical ridges, which are most conspicuous near the umbilicus. Male flowers near the apex of the receptacles which contain the gall flowers, sessile, broad; the perianth of 3 or 4 broad, lax, thin pieces which completely envelope the 2 almost sessile, broadly-ovate, apiculate anthers. Gall flowers with a perianth of 3 broad, ovate-rotund, distinct pieces; the ovary ovoid, shining, smooth; the style short, lateral, with a rather large, infundibuliform stigma. Fertile female flowers not seen.

Amboina,—*De Fretes.*

This resembles *F. variegata*, Bl., in a general way, but has much smaller and more pubescent leaves; the receptacles of this are also much smaller and more depressed than those of *variegata*, and the male flowers are much smaller and broader. Besides those collected by De Fretes, I have seen no specimens of this, and none of the receptacles of his collecting contain perfect female flowers.

The vernacular name of this is *moessoe.* Count Solms Laubach (*Botanische Zeitung*, vol. 44. p. 562) mentions specimens which are preserved under the name *moessoe* in the Herbarium at Buitenzorg; but, as he describes the perianth of the gall flowers of these as fimbriated in a remarkable manner unknown in any named species of *Ficus*, I conclude that the *moessoe* of Buitenzorg and that collected by De Fretes in Amboina must be different plants. My descriptions and figures are founded upon De Fretes's original specimens and they show no such peculiarity of the perianth as Count Solms Laubach describes. This Buitenzorg *moessoe* is probably a new species.

PLATE 217.—*F. Sycomoroides*, Miq. Leafy twig. 1, 2, 3, receptacles seen from the apex, base, and side; 4, stipules—*of natural size;* 5, unexpanded male flower; 6, stamens from male flower; 7, gall flower: *enlarged.*

202. FICUS GLOMERATA, *Roxb. Corom. Pl.* ii. *No.* 123; *Willd. Spec.* iv. 1148; *Roxb. Fl. Ind.* iii. 558; *Wight Icon* 667; *Miq. in Ann. Mus. Lugd. Bat.* iii. 297; *Bedd. Fl. Sylv.* 224; *Kurz For. Flora Brit. Burm.* ii. 458; *Brandis For. Flora* 422. tab. 49; *Benth. Fl. Austr.* vi. 178; *Wall. Cat.* 4511A and B.—*Covellia glomerata*, Miq. in Lond. Journ. Bot. vii. 465; Dalz. and Gibs. Fl. Bombay, 243.—*F. Chittagonga*, Miq. in Ann. Mus. Lugd. Bat. iii. 228, 294.—*F. racemosa*, Wall. (non Roxb.) Cat. 4549.—*F. mollis*, Miq. (non Vahl.) in Ann. Mus. Lugd. Bat. iii. 283, 296.—*Covellia mollis*, Miq. in Lond. Journ. Bot. vii. 466; Fl. Ind. Bat. i. pt. 2. 326.

A tree. The young shoots glabrous or pubescent, slightly scabrid. Leaves petiolate, membranous, alternate; from ovate-oblong, obovate-oblong, to oblong-lanceolate; the apex gradually tapering to a bluntish point; edges entire; base blunt, rarely acute, 3-nerved; primary lateral nerves 4 to 6 pairs; lower surface glabrous in the type (pubescent in two varieties), with numerous minute tubercles; upper surface glabrous (softly pubescent in var. *mollis*); length of blade 4 to 5 in. (in var. *elongata* to 7 in.); petioles from ·8 to 1·3 in. (rarely 2 in.), glabrous (pubescent in two varieties); stipules rather persistent, ovate-lanceolate, scarious, pubescent externally, ·6 to ·8 in. long. Receptacles pedunculate, borne on short, leafless, tubercled, warted, scariously bracteolate branches often only a few inches long which issue from the stem and larger branches; rarely (in var. *leucocarpa*) axillary; much contracted at the base when young; pyriform, sub-globular, or subturbinate, smooth or pubescent and of a reddish colour when ripe, and about 1·25 in. across; the umbilicus depressed; basal bracts 3, ovate, triangular. Male flowers rather numerous near the mouth of the receptacles, sessile; the perianth of 3 or 4 inflated membranous pieces which completely envelope the anthers; anthers 2, elongated, ovate, the filaments united. Gall flowers pedicellate; the perianth gamophyllous, irregularly toothed, covering only the base of the ovoid, rough ovary; style lateral, elongate; stigma clavate. Fertile female flowers almost sessile; the perianth gamophyllous, with 4 or 5 long, lanceolate, teeth which completely envelope the small, minutely-tuberculate achene; style much elongate, sub-terminal; stigma clavate. All three kinds of flowers occur in the same receptacle; the males forming a zone near the mouth, the sessile females forming a layer nearest the walls of the receptacle, and the pedicellate gall flowers a more internal layer.

VAR. CHITTAGONGA. Young shoots, under surfaces of the leaves, and the receptacles pubescent; the leaves ovate-oblong or ovate-lanceolate, occasionally sub-opposite; receptacles pyriform.—*F. Chittagonga*, Miq.

Chittagong, and occasionally in Bengal.

VAR. MIQUELII. Leaves as in the typical form; the receptacles densely covered with white pubescence, occasionally axillary.—*F. leucocarpa*, Miq. MSS.—*?F. goolereea*, Roxb. Fl. Ind. iii. 538.

In dry situations over the plains of India generally, finding its western limit in Rajputana and the Salt Range in the Panjab.

This is the form on many herbarium specimens of which Miquel has written the name *F. leucocarpa*, Miq.; but it is not the plant described by him under that name (*Lond. Journ. Bot.* vi. 576), that plant being, as I have endeavoured to show at p. 62, *F. infectoria*, Roxb.

VAR. MOLLIS. Both surfaces of the leaves, at least when young, softly pubescent.—*Covellia mollis*, Miq.

Java,—Zollinger's Herb. No. 753.

VAR. ELONGATA. Leaves oblong, with acute apex about 7 in. in length; otherwise as in the typical form.

Burma,—*Kurz;* Chittagong,—*Lister.*

This variety brings the species *glomerata* so near to *F. lanceolata*, Ham., that the glabrous, verrucose, ridged receptacles of the latter constitute the only distinction.

PLATE 218.—*F. glomerata*, Roxb. A: typical form.—1, apex of leafy branch; 2, fascicle of mature receptacles—*of natural size;* 3, male flower, unexpanded; 4, male flower with 3 of the pieces of the perianth removed; 5, gall flower; 6, ovary of the same removed from the perianth; 7, achene from fertile female flower; 8, fertile female flower—*all from the same receptacle and all enlarged.* B: var. *Miquelii.*—Branch with axillary receptacles nearly mature: *of natural size.*

PLATE 219.—*F. glomerata*, Roxb. var. *Chittagonga.* 1, apex of leafy branch; 2, leafless branch bearing young receptacles; 3, fascicle of nearly mature receptacles; 4, vertical section of a nearly mature receptacle; 5, apex of the same—*all of natural size.*

203. FICUS HENRICI, *nov. spec.*

A large tree. The young branches puberulous. Leaves small, petiolate, coriaceous, oval or lanceolate, entire; the apex rather blunt; the base rounded, 3-nerved; primary lateral nerves 4 to 6 pairs, obscure; lower surface slightly pale, minutely puberulous, the reticulations rather distinct; upper surface glabrous; length of blade 1·5 to 2 in.; petiole ·4 in.; stipules ovate-lanceolate. Receptacles on short, rather thin, tubercular, leafless branches from the stem, sub-globular; the apex umbonate when young; when adult the apex flat, with the umbilicus depressed; when quite ripe smooth, pinkish-red, mottled, 2 in. across; basal bracts 3, ovate-lanceolate, spreading. Male flowers only towards the mouth of the receptacles; the perianth of 3 large, loose, inflated pieces, which quite cover the 2 elongate-ovate anthers. Gall flowers pedicellate, with gamophyllous 3-cleft perianth which covers only the base of the tubercular, ovoid ovary; style lateral, elongate; stigma dilated. Fertile female flowers not seen.

Sumatra, Padang,—*Beccari* (Herb. Beccari No. 854); on Mount Dempoo, at an elevation of 5,500 ft.,—*Mr. H. O. Forbes* (Herb. Forb. No. 2265).

This species comes near *F. lanceolata*, Ham., and *F. glomerata*, Roxb. Mr. Forbes's specimens have narrower leaves than Sig. Beccari's, but in other respects they are alike.

Plate 220.—*F. Henrici*, King. 1, leafy branch; 2, piece of stem bearing a leafless branch with immature receptacles; 3, immature receptacle from Sig. Beccari's specimens; 4, narrowly lanceolate leaf from Mr. H. O. Forbes's specimen—*all of natural size;* 5, a stipule; 6, unexpanded male flower; 7, male flower opened out to show the 2 anthers; 8, gall flower—*all enlarged.*

204. Ficus Clarkei, *nov. spec.*

A tall tree. The young shoots minutely scabrid-hispid. Leaves shortly petiolate, thinly coriaceous, inequilateral, oblong, or narrowly elliptic; the apex acuminate; edges entire or with one or two rather coarse teeth near the apex; base cuneate, 3-nerved; primary lateral nerves at a wide angle to the midrib, 6 to 8 pairs, prominent beneath, as are the midrib and reticulations; both surfaces quite glabrous; the lower obscurely minutely tuberculate; length of blade 6 to 10 in.; petiole ·4 in.; stipules lanceolate, convolute, ·5 in. long. Receptacles in short, scariously-bracteate panicles from the stem and larger branches; pedunculate pyriform, smooth, red when ripe, about 1 in. across; the base contracted into a long stalk at the junction of which with the peduncle proper are 3 ovate-lanceolate bracts; peduncle puberulous, ·3 in. long. Male flowers in a zone near the mouth of the receptacles occupied by gall flowers; the perianth of 3 large, loose, thinly membranous, imbricate pieces which completely enfold the stamens; stamens 2 or 3, on short filaments, the anther ovate, apiculate. Gall flowers with a gamophyllous 3-cleft perianth, the segments of which are linear-lanceolate; the ovary ovoid, slightly tubercular; the style lateral, thickened below, elongate; the stigma cylindric. Fertile female flowers not seen.

Khasi Hills, at 500 feet,—*Mr. C. B. Clarke.*

Mr. Clarke describes the bark of this as whitish, and the trunk as tall and unbranching, and in these respects it agrees with *F. pomifera*, Wall., to which it is in other points also allied. It differs, however, from *pomifera* in having shorter petioled, oblique leaves with a different venation.

Plate 221.—*F. Clarkei*, King. 1, apex of leafy branch; 2, part of a branch from the stem bearing two mature receptacles; 3, apex of a receptacle; 4, base of the same; 5, stipules—*all of natural size;* 6, unexpanded male flower; 7, the 3 stamens of a male flower, the perianth having been removed; 8, gall flower: *enlarged.*

205. Ficus Aruensis, *nov. spec.*

A tree. The young branches with short, adpressed, whitish pubescence. Leaves petiolate, sub-coriaceous, inequilateral, elliptic-lanceolate; the apex acuminate; base cuneate; edges waved, sub-entire; primary lateral nerves 5 or 6 pairs and, like the midrib, sparsely adpressed-puberulous on both surfaces; the lower surface with many minute tubercles, dull; the upper shining, with a very few adpressed hairs; length of blade ·35 in.; stipules lanceolate, acuminate, pilose externally, ·4 in. long. Receptacles on much shortened, tuberculate, leafless branches from the stem; long-pedunculate, globose, glabrous, verrucose, scabrid, about ·35 in. across, with a few scattered scales on the sides; umbilical scales large, numerous, triangular, recurved; basal bracts none; pedicels slender, glabrous, with 1 or 2 minute bracteoles. Male and gall flowers not seen. Fertile female flowers sub-sessile; the perianth gamophyllous, with 5 lanceolate teeth, hyaline, closely enveloping the rather smooth. obliquely-ovoid, compressed achene; style lateral, longer than the ovary; stigma clavate.

The Island of Aru,—*Sig. Beccari* (Herb. Becc., without number).

PLATE 222.—*F. Aruensis*, King. 1, apex of leafy branch; 2, shortened branch, bearing mature receptacles—*of natural size;* 3, receptacle; 4, umbilical bract from same; 5, stipules; 6, fertile female flower, 7; achene of fertile female flower. *Nos. 3 to 7 are enlarged.*

206. FICUS ACIDULA, *King.*

A tree. All parts glabrous except the petioles, the primary lateral nerves, the midribs, and the under surfaces of the leaves, which are puberulous. Leaves petiolate, membranous, narrowly oblong-lanceolate; the apex acute; edges entire; base slightly narrowed, blunt, 3-nerved; lateral primary nerves 10 to 12 pairs, not prominent; lower surface pale in colour, minutely reticulate, with many white papillæ, puberulous; upper surface glabrous, except the midrib and primary nerves; length of blade 2·5 to 4 in.; petioles varying in length from ·6 to 1·5 in.; stipules lanceolate, scarious, ·4 in. long. Receptacles on rather short, leafless, branchlets from the larger branches, sub-sessile, sub-globose, mottled, glabrous, 1·1 in. across; the apex a little flattened, and the umbilicus slightly depressed; the base constricted into a short stalk at the union of which with the very short peduncle proper are 3 minute triangular bracts; peduncle proper ·1 in. long. Male flowers in a zone under the bracts of the mouth, diandrous; the anthers elongate, apiculate, with thick connective; perianth of 3 loose, concave, inflated pieces. Gall flowers pedicellate, with gamophyllous 3- to 4-cleft perianth which covers only the lower half of the smooth, sub-globose, ovary; style elongated, lateral. Fertile female flowers in the same receptacle as the two preceding, sessile, the gamophyllous, sharply 4-toothed perianth completely enveloping the minutely-tubercular, obovoid, achene; style lateral, elongate; the stigma clavate.

Sarawak, Borneo,—*Sig. Beccari* (Herb. Beccari, No. 2832).

Signor Beccari, who alone has collected this species, describes the receptacles as acid —a character so unusual in a fig that I have named the species in accordance with it. This externally resembles *F. botryocarpa*, Miq., but the leaves of this have much longer petioles and a different venation.

PLATE 223.—*F. acidula*, King. 1, apex of leafy branch; 2, a receptacle-bearing branch with two nearly mature receptacles; 3, mature receptacle; 4, apex of the same; 5, stipules—*all of natural size;* 6, male flower, unexpanded; 7, the anthers removed from a male flower; 8, gall flower; 9, fertile female flower; 10, achene and style of fertile female flower—*all enlarged.*

207. Ficus lanceolata, *Ham. in Roxb. Fl. Ind.* iii. 557; *Wight Icon* 645; *Miq. in Ann. Mus. Lugd. Bat.* iii. 297; *Kurz For. Flora Brit. Burm.* ii. 457; *Wall. Cat.* 4512A, B, C.—*Covellia lanceolata*, Miq. in Lond. Journ. Bot. vii. 465.

A much-branched, glabrous shrub. The leaves alternate, membranous, narrowly lanceolate, entire, occasionally remotely serrate; base 3-nerved; primary lateral nerves 6 to 8 pairs, little prominent; under surface minutely tubercular; length of blade 4 to 8 in.; petiole ·4 to ·5 in.; stipules lanceolate, ·5 in. long. Receptacles in fascicles of from 6 to 8 from the stem and larger branches, with long peduncles; when young pyriform, when ripe turbinate; the apex concave and the base slightly constricted; glabrous, of a russet-brown when ripe, with many white warts; basal bracts 3, ovate-acute, small. Male flowers numerous near the mouth of the receptacles containing gall flowers, shortly pedicellate; the perianth of 3 or 4 large, loose, inflated, membranous pieces, which completely envelope the anther; anthers 2, ovate, with short filaments. Gall flowers with a perianth like the fertile females; the ovary ovoid, smooth; the style short, sub-terminal; stigma dilated. Fertile female flowers with the perianth short, gamophyllous, 3-toothed; achene obliquely ovoid, minutely tubercled; style elongate, lateral; stigma clavate.

Khasi Hills, Chittagong, Burmah, up to elevations of 1,200 ft.; usually by the banks of streams.

A species related to *F. glomerata* and to *F. Roxburghii*, Wall.

Plate 224.—*F. lanceolata*, Ham. 1, leafy branch; 2, fascicle of mature receptacles from the stem; 3, vertical section of a receptacle—*natural size*; 4, male flower, unexpanded; 5, the same opened up to show the 2 anthers; 6, fertile female flower: *enlarged*.

DOUBTFUL AND IMPERFECTLY KNOWN SPECIES.

From the following list, manuscript names (except those of Wallich's Catalogue) and published names unaccompanied by descriptions, are for the most part excluded.

F. abbreviata, Wall. Cat. 4573, is indeterminable. The only specimens are young shoots of some creeping species.

F. albinervia, Miq. Fl. Ind. Bat. i. pt. 2. 315. I have seen this only in the Herbarium at Utrecht, and the material is too scanty to be dealt with. It is from Bali.

F. (*Cov.*) *albipila,* Miq. Fl. Ind. Bat. Suppl. p. 434. Miquel describes this from leaf specimens only. In his revision of *Ficus* (Ann. Mus. Lugd. Bat. iii. 283, 296) he subsequently reduces it to *F. mollis,* Miq. (non Vahl.). An examination of his type specimens of both these species leads me to reject this reduction; to consider *F. albipila* a separable species, which from the want of receptacles I cannot describe; and to reduce *F. mollis,* Miq. (non Vahl.) to a form of *F. glomerata,* Roxb.

F. alternans, Wall. Cat. 4555, is present only in M. deCandolle's set. I do not recognise it.

F. amara, Noronh. Act. Bat. v. 76, possibly *F. hispida,* Linn. fil. I have seen no specimen.

F. amblyphylla, Miq. Ann. Mus. Lugd. Bat. iii. 286.—*Urostig. amblyphyllum,* Miq. Lond. Journ Bot. vi. 569, is *F. rubra,* Roth., not of Lamk., and = *F. retusa,* Linn., var. *nitida.*

F. ampelos, Lamk. (not of Burm.), is probably *F. gibbosa,* Bl. I have seen no specimen.

F. ampla, Kth. et Bouché, Ind. Sem. Hort. Berol, p. 18, is probably *F. infectoria,* Roxb.

F. amplissima, Sm. in Ree's Encyc. xiv, No. 68. This is *F. tsiela,* Roxb.

F. ampullacea, Wight MSS., is reduced by Miquel to *F. humilis,* Roxb. I have seen no specimen.

F. angustata, Miq. in Lond. Journ. Bot. vii. 434. Described from Wight's S. Indian Herbarium, and judging from the description—for I have seen no specimen—is *F. gibbosa,* Bl., var. *parasitica.*

F. angustifolia Roxb. Fl. Ind. iii. 554. Of this I have seen no specimen; but from Roxburgh's drawing in the Calcutta Herbarium, I consider this to be *F. glaberrima,* Bl.

F. aperta, Wall. Cat. 4552. Present only in M. deCandolle's set of the Wallichian plants. Sheet A was collected by Finlayson probably in the Straits. I do not recognise it, the specimen being a poor one. Sheet B is from Siam; it is *F. insignis,* Kurz.

F. apiculata, Miq. Ann. Mus. Lugd. Bat. iii. 280.—*Urost. apiculatum,* Miq. Lond. Journ. Bot. vi. 570. A species founded by Miquel on Wight's No. 1916, of which I have been able to find no specimen in the Herbaria of Kew, Leiden, Utrecht, or Calcutta. Miquel never saw receptacles, but, from his description of it, Wight's plant was doubtless a *Urostigma.* Unfortunately Miquel described (Zoll. Syst. Verz. pp 92, 98) and named as *F. apiculata* another and totally different plant (Herb. Zoll. 651), of which I have seen a specimen at Utrecht with the words "*F. apiculata,* Miq MSS.," in Miquel's handwriting, attached to it. This second *F. apiculata* is merely a form of *F. fulva,* Reinw., and has no resemblance to the *F. apiculata* described in Lond. Journ. Bot. l. c. This name must therefore be abandoned.

F. aurantiaca, Noronh. Verh. Bat. Gen. v. 75, is probably *F. obscura,* Bl.

F. auriculata, Lour. Fl. Coch. China ii. 666, is probably *F. cunia,* Ham. I have seen no specimen.

F. Backhousii, Miq. in Journ. Bat. Neerl. i. 240. I have never seen this.

F. (*Urostig.*) *balicum,* Miq. Fl. Ind. Bat. i. pt. 2. 348. I have seen no specimen of this, and I cannot say what relation it bears to *F. balica* which Miquel described on p. 314 of the same book.

F. basidentula, Miq. Fl. Ind. Bat. i. pt. 2. 314. A species described by Miquel, but of which he had seen no receptacles. The leaves in shape resemble those of *F. cuspidata,* Reinw., var *sinuata,* but in texture they are more like those of *F. callosa,* Willd.

F. begoniæfolia, Wall., is simply a form of *F. cunia*, Ham., issued (as 4531 F. of Wall. Cat.) under the above name. Wallich himself reduced this to *conglomerata*, Roxb. (which is *F. cunia*, Ham.)

F. Benjaminea, Thunbg. Dissert, No. 15, is probably the same as *F. nitida*, Thunbg., and *F. retusa*, Linn.

F. biglandulosa, Wall. Cat. 4480, is a species once cultivated in the Calcutta Botanic Garden. I do not recognise it.

F. bistipulata, Griff. Notul. iv. 398; Ic. 559I. Griffith's material (Kew Distrib. 4616) is rather scanty, and I hardly like to deal with it. It is either *F. erecta*, Thunbg., or near it.

F. caloneura, Kurz F. Flora B. Burmah ii. 448. Kurz never saw any receptacles of this, and the leaves (prominently biglandular at the base), by which alone the species is represented in the Calcutta Herbarium, are more suggestive of some Euphorbiacious plant than of a *Ficus*.

F. cannabina, Lour. Fl. Coch. Ch. ii. 821. No specimen seen by me.

F. chloroleuca, Miq. Fl. Ind. Bat. i. pt. 2. 294. Miquel, in Ann. Mus. Lugd. Bat. iii. 290, reduces this to one of the two plants which he himself named *F. apiculata*, and which in my opinion is *F. fulva*. Reinw.

F. (*Urostig.*) *chrysophthalma*, Miq. Lond Journ. Bot. vi. 575. This species was founded by Miquel on a specimen of Wight's in Herb. Arnot, No. 949. I have neither been able to find the original, nor anything bearing this name, in any herbarium I have consulted.

F. cinerascens, Wall. Cat. 4535. I cannot identify. The leaves are oblanceolate, coriaceous, and glaucous beneath. There are no receptacles on the only specimen I have seen.

F. compressicaulis, Bl. Bijdr. 439, is founded on a leafy branch only.

F. condaravia, Ham. in Trans. Linn. Soc. xv. 131, appears to be *F. retusa*, Linn.

F. congesta, Roxb. Fl. Ind. iii. 560; Wight's Icones t. 644; Wall. Cat. 4510.—*Covellia congesta*, Miq. in Lond. Journ. Bot. vii. 463; Fl. Ind. Bat. i. pt. 2. 324, t. 23. Wallich's specimens of this (Cat. 4510) are without receptacles. They agree fairly well as to leaves with Roxburgh's description and unpublished figure, but I have seen nothing else which does so. I think the species is probably near to *F. fistulosa*, Reinw. Miquel in Fl. Ind. Bat. l. c. gives this as the *Moessoe* of the Malays; but in Mus. Lugd. Bat. iii. 230 he gives *F. sycomoroides*, Miq., as the *Moessoe* (see *supra*, p. 173). Miquel also identifies *F. congesta* with *Sycocarpus congesta*, Miq. in Ann. Sc. Nat. Ser. III, I, p. 33.

F. cordifolia, Bl. Bijdr. ii. 438; Miq. in Ann. Mus. Lugd. Bat. iii. 260. In his list of species of *Ficus* in Ann. Mus. Lugd. Bat. iii. 285, Miquel puts this as a *Urostigma* near *F. Dalhousiæ*, Miq.; and in his Fl. Ind. Bat. i. pt. 2. 334, he names it *Urostig. Javanicum*, Miq., and quotes *verbatim* Blume's description. The only specimens of Blume's plant are the three in the Herbarium at Leiden, and these I have examined. All three are without attached receptacles. One consists, besides the leaf-twig, of a piece of branch with scaly, pale brownish bark, and the remains of a receptacular peduncle ·75 in. long and as thick as a crow-quill. In a separate envelope are some receptacles, globular, nearly glabrous, slightly verrucose, about ·75 in. in diameter, and with broad apical umbilicus. For convenience of reference I give here Blume's and Miquel's descriptions and a figure of one of the Leiden specimens. In my opinion the plant is no *Urostigma*, but probably a *Neomorphe*. Blume's description is as follows:—"Foliis cordatis, ovatis, vel ovato-oblongis, acuminatis, coriaceiis, supra glabris, subtus tomentosis; fructibus obovatis, pedunculatis, glabris, solitariis; caule arboreo; petiol. longit. 2—2½ pollic. folior.; longit. 4½ to 9 pollic.; latitud. 3—5½ poll." Miquel's description is as follows:—"Arbor; ramuli subflavido-puberi; folia alterna e basi cordata, lata-ovato, acuminata; præter costulam utrinque unam e basi costulis utrinque 6—9 erecta-patulis transverse reticulatis pertensa, 9—5 poll. longa, cum petiolis 2—3 poll. longis, subtus molliter albido-pubescentia; receptacula subovoidea-globosa, basi tribracteata, glabra, pedunculata, solitaria."

PLATE 225.—*Ficus cordifolia*, Bl. From a specimen in the Royal Herbarium, Leiden.

F. coriacea, Ait. Hort. Kew iii. 453. I have not seen.

F. cornifolia, Kth. et Bouché in Ind. Sem. Hort. Berol. 1846, p. 19. I cannot suggest what this is.

F. coronata, Colla. Hort. Ripul. t. 8, is identified by Miquel (Lond. Journ. Bot. vii. 234) with *F. ulmifolia*, Lamk., which is itself an obscure species.

F. costigera, Miq. Ann. Mus. Lugd. Bat. iii. 296.—*Covellia costata*, Miq. (not of Ait.) in Lond. Journ. Bot. vii. 468. A species founded on Wight's specimen (Herb. Prop.) No. 872. I have not seen this.

F. crassinervia, Hort. Berol., is probably *F. bengalensis*, Linn.

F. crenulata, Hassk. Cat. Hort. Bot. Bogor. p. 76; Miq. Fl. Ind. Bat. i. pt. 2. 321. A species founded on a leaf-twig. I do not know what it may be.

F. cuneata, Wall. Cat. 4534, is, as I am informed by Mr. W. B. Hemsley, no Ficus at all, but *Erythroxylon Burmanicum*, Griff.

F. dæmonum, Zoll. et Mor. Syst. Verz. p. 77, is probably, as Miquel suggests, *F. obscura*, Bl.

F. denticulata, Ham. in Trans. Linn. Soc. xv. 145, is referred by Miquel, and probably rightly, to *F. quercifolia*, Roxb.

F. dichrotrix, Miq. Of this there is a very poor specimen at Utrecht. It is *F. obscura*, Bl.

F. (*sub. Urostig.*) *Diepenhorstii*, Miq. Fl. Ind. Bat. Suppl. 439, is founded on a leaf specimen from Sumatra.

F. difformis, Lamk. Enc. ii. 499. Lamark's description is too meagre to admit of certainty as to what plant he meant. I have followed Mr. Bentham in treating this as probably the same as *F. gibbosa*, Blume; see p. 5.

F. dimidiata, Wall. Cat. 4575, is probably *F. aurantiaca*, Griff. The only specimens are leafy shoots.

F. discolor, Miq. Ann. Mus. Lugd. Bat. iii. 221, 291. I have seen no specimen of this; but from Miquel's description, I should think it is probably referable to either *F. fulva*, Reinw., or *F. toxicaria*, Linn.

F. drupacea, Thunbg. Ficus No. 11. I can make nothing of this.

F. ellipsoidea, Miq. Ann. Mus. Lugd. Bat. iii. 230, 295. The type of this in the Utrecht Herbarium appears to me to be simply *F. subulata*, Bl.; and a specimen at Kew, named *ellipsoidea* by Miquel's own hand, is undoubtedly the same as the type of *trematocarpa*, Miq., which is the same as *F. Decaisneana*, Miq. *F. ellipsoidea* as a species therefore falls to the ground.

F. Emodi, Wall. Cat. 4515. This is represented in the Wallichian collections by leaf specimens said to have come from Gossainthan, a mountain in Nepal. The leaves of these are like those of *F. laevis*, Bl., near which this plant has been put by Miquel (Lond. Journ. Bot. vii. 73; Ann Mus. Lugd. Bat. iii. 278, 293), but they are more cordate at the base and have much longer petioles. In my opinion they more resemble the leaves of *F. Arnottiana*, Miq., which is not, however, a Himalayan plant. But Wallich's localities are not always to be depended upon; and his No. 4515 may have been attributed to Gossainthan through some confusion or misplacement of tickets.

F. erythrosperma, Miq. in Ann. Mus. Lugd. Bat. iii. 226, 293. From Miquel's description of this, and from the specimens in the Utrecht Herbarium, named by himself and which agree with his published description, I should be inclined to regard this as a form of *F. leptocarpa*, Steud. (= *ramentacea*, Roxb.), from the typical form of which it appears to differ only in having obovate instead of ovate leaves. The specimens at Kew and Leiden bearing this name (written also by Miquel's hand) do not agree with his description, and they clearly belong to some other species; but the materials are too imperfect for accurate determination.

F. excelsa, Miq. (sub. *Urost.*) Fl. Ind. Bat. i. pt. 2. 350; Miq. in Ann. Mus. Lugd. Bat. iii. 286. A species from Western Java. Miquel's type of this is at Utrecht, and consists of three leaves, which can hardly have been collected from the same plant. This species is not represented in Kew, Leiden, Calcutta, nor in M. deCandolle's Herbarium at Geneva.

F. fallax, Miq. Fl. Ind. Bat. i. pt. 2. 308; Ann. Mus. Lugd. Bat. iii. 292. The type of this in the Utrecht Herbarium appears to be either a form of *F. cuspidata*, Reinw., or of *F. irregularis*, Miq.

F. filiformis, Bl. Bijdr. 442. Described without receptacles: probably founded on a young shoot of some scandent species. I have seen no specimen.

F. Gasparriniana, Miq. in Lond. Journ. Bot. vii. 436; Ann. Mus. Lugd. Bat. iii. 294. I have seen only one specimen of this, and it is too imperfect to be dealt with satisfactorily. The species, if it be one, is evidently near *F. Silhetensis*, Miq., and *F. erecta*, Thunbg.

F. glomerata (not of Roxb.), Wall. Cat. 4501C in part = *F. saemocarpa*, Miq.

F. gracilis, Wall. Cat. 4572, is not a Ficus.

F. grisea, Wall. Cat. 4544. All the specimens I have seen consist of twigs without leaves or receptacles.

F. grossivenis, Miq. Ann. Mus. Lugd. Bat. iii. 227, 294. From Borneo and doubtfully from Ambon and Ceram. I have seen no specimen. From the description, this must be either *F. lanata*, Bl. *F. ramentacea*, Roxb., or near these.

F. grossularia, Herb. Ham. Miquel reduces to his *Urostig. nervosum*, which is = *F. nervosa*, Heyne.

F. haplophylla, Kurz For. Flora B. Burmah ii. 461. Kurz mentions this, without describing it fully as a species from Khasia and Chittagong, near *conglomerata*, Roxb. (= *cunia*, Ham.). I have seen no specimen.

F. Hunteri, Miq. (non Forsk.) Lond Journ. Bot. vii. 225; Fl. Ind. Bat. i. pt. 2. 296; Ann. Mus. Lugd. Bat. iii. 290. I could find nothing bearing this name in the Herbaria at Utrecht or Leiden. It is the name given by Miquel to *F. palmata*, Roxb. (not of Forsk), of which Miquel had seen no specimen, but which he suggests may be a variety of *F. fulva*, Reinw. Now Roxburgh's *F. palmata* came from Penang, and I incline to believe that Roxburgh had described as *F. palmata* a 3-lobed form of *F. alba*, Reinw., which is still a very common plant in Penang; while *F. fulva* does not occur there. Roxburgh does not mention *F. alba* from Penang, unless this *palmata* be it; and, as *alba* is so common in Penang, he could scarcely have missed having the plant sent to him in his collections from thence.

F. hypsophila, Miq. Pl. Jungh. 60, consists of specimens which I have referred partly to *F. pisifera*, Wall., and partly to *F. obscura*, Bl.

F. incisa, Wall. Cat. 4490. The type specimen consists of a few 3-lobed leaves something like those of *F. alba*, but different. I do not recognise them.

F. inclinata, Herb. Ham. in Wall. Cat. 4486. Two collectings of this are catalogued by Wallich, viz. *A* from Julpaigoree (in Bengal) and *B* from Silhet. On the sheet of the former in the type set with the Linnæan Society there is no specimen, but only a name; but on a separate sheet, also numbered 4486, but bearing the name *F. pedicellata*, there is glued down a specimen which exactly resembles the specimen in deCandolle's Herbarium numbered 4486B and named *F. inclinata*. Both appear to be *F. laevis*, Bl.

F. inconstantissima, Miq. Fl. Ind. Bat. Suppl. 431, is founded on imperfect specimens from Sumatra, probably = *F. rostrata*, Lamk.

F. indica, Lamk. Encyc. ii. 494, is probably *F. Mysorensis*, Heyne.

F. insularis, Miq. in Lond. Journ. Bot. vii. 435; Ann. Mus. Lugd. Bat. iii. 293; Maxim. in Bull. Acad. St. Petersb. xi. 332. I have examined the two type sheets of this at Kew. They are both from Loo Choo. One is undoubtedly referable to *F. Decaisneana*, Miq., the other to *F. gibbosa*, Bl. Cuming's Philippine specimen (No. 1943), which Maximowicz (l. c.) considers as the same as these, appears to me to be *F. subulata*, Bl.

F. lachnocaula, Miq. Ann. Mus. Lugd. Bat. iii. 287. I have seen no specimen of this and no description.

F. lasiophylla, Link. Enum. ii. 449. This is reduced by Miquel (Lond. Journ. Bot. vi. 572) to *F. bengalensis*, Linn.

F. longifolia, Wall. Cat. 4570E, is a mixture of the three species *indica*, *apiocarpa*, and *obtusifolia*.

F. macropoda, Kurz (not of Miq.) For. Flora B. Burm. ii. 459. Kurz left no specimen of this either in his own private herbarium or in that of the Calcutta Botanic Garden. It is probably near *F. copiosa*, Steud.

F. malabarica, Miq. Lond. Journ. Bot. vii. 457, is founded on Wight's Herb. No. 873, and is *Artocarpus chaplasha*, Roxb.

F. menadana, Miq. in Ann. Mus. Lugd. Bat. iii. 233, 296. This species is founded on leaf specimens collected by Teysmann at Menado. Receptacles are unknown; the leaves look like those of *F. rudis*, Miq.

F. monticola, Miq. Ann. Mus. Lugd. Bat. iii. 216, 286. This species is founded on the specimen distributed as Ficus No. 121 of the Herb. Ind. Or. of Hook. fil and Thoms. by whom it was collected in the Khasia Hills. I find no specimens with good receptacles in any herbarium I have consulted, but I think this comes too near *F. infectoria*, Roxb. to be separated from that species.

F. morifolia, Vahl. Enum. ii. 203; Miq. Lond. Journ. Bot. vii. 227; Ann. Mus. Lugd. Bat. iii. 290. This is said to be ex Ind. Or., but I have seen no specimen.

F. neglecta, Dcne. N. Ann. Mus. iii. 494; Miq. (sub. *Urostig.*) Fl. Ind. Bat. i. pt. 2. 347. Decaisne gives Timor as the native place of this species, of which I have seen no specimen. It may be near *F. retusa*, Linn.

F. Nepalensis, Spreng. Syst. iii. 779. The only traces of this that I have been able to find in Herbaria are two drawings at Leiden bearing this name. The plant figured in both is *F. foveolata*, Wall.

F. nuda, Kurz (not of Miq.) For. Flor. B. Burmah ii. 445. Kurz gives two forms of his *nuda*, viz. var. 1, *nuda* proper, and var. 2, *macrocarpa*. What the former is I cannot say, as the author has left no specimen of it; but I think it is probably *F. rhododendrifolia*, Miq. It certainly, from the description, cannot be *F. nuda*, Miq. The var. *macrocarpa*, of which he has left specimens, is *F. Kurzi*, mihi.

F. oblongifolia, Don Prod. Fl. Nepal, p. 61. I cannot identify this: no specimens are now extant.

F. ovata, Don (not of Vahl.) Prod. Fl. Nepal. p. 61, probably *F. scandens*, Roxb.

F. oxyphylla, Miq. in Zoll. Syst. Verz. p. 93, was reduced by Miquel himself (Ann. Mus. Lugd. Bat. iii. 294) as probably = *F. erecta*, Thunbg.

F. pallida, Wall. Cat. 4567 = *F. retusa*, Linn.

F. peltata, Bl. Bijdr. 438. Blume's description occupies only two lines, and includes no reference to receptacles. The specimen bearing this name in the Utrecht Herbarium is an Aroid.

F. picta, Noronh. Verh. Bat. Gen. v. 76, is probably *F. Benjamina*, Linn.

F. populiformis, Schott. MSS. }
F. populnea, Kunth et Bouché. } These are both probably *F. Arnottiana*, Miq.

F. pubigera, Kurz (not of Wall., nor of Brandis For. Flora, p. 424) For. Flora B. Burm. ii. 450. The plant thus named is described by Kurz as a tree. There is no specimen of it at Calcutta. Kurz's *F. pubigera* is not Wallich's, which is a climber reducable to *F. foveolata*, Wall. What *F. foveolata*, Kurz, is I do not know, no specimen being extant.

F. pulchra, Wall. Cat. 4571; Miq. in Lond. Journ. Bot. vii. 430. Of this only leaf specimens are extant, and they possibly do not belong to any Ficus.

F. pyrifolia, Burm. Fl. Ind. p. 226. Burmann's description is too brief to identify any plant by. Miquel (in Ann. Mus. Lugd. Bat. iii. 294) reduces to *F. pyrifolia*, Burm., *F. Japonica*, Bl. But Blume's description is also very meagre, and it is, I think, unsafe to hazard any absolute opinion as to the identity of the plants thus named by these two authors. Specimens named *F. pyrifolia*, Burm. (*F. Japonica*, Bl.), in the Leiden Herbarium agree exactly with what I understand as *F. erecta*, Thunbg. (non alior.), and to that species I have doubtfully reduced this (p. 141). But a plant cultivated in the Botanic Gardens at Utrecht and Buitenzorg as *F. pyrifolia*, Burm., does not agree with the Leiden Herbarium specimens.

Urostig. pyrifolium, Miq. Fl. Ind. Bat. i. pt. 2. 338. A species founded on specimens sent to Miquel from the Buitenzorg Herbarium under the names *F. pyrifolia*, Burm., and *F. rubescens*, Bl. I have not seen the specimens.

F. (*sub. Pogonotro.*) *pyrrhopoda*, Miq. Fl. Ind. Bat. Suppl. 435, is probably *F. obtusa*, Hassk. The specimens I have seen are incomplete.

F. racemosa, Linn. Syst. p. 922; Rheede Hort. Malab. i. 25. Rheede's figure is the foundation for this species. Miquel identifies it with *F. asperrima*, Roxb., but it looks more like *F. dæmonum*, Roxb. (= *hispida*, Linn. fil). The description gives the leaves as soft ("*mollia, glabra, et lenia*"), whereas those of *dæmonum* are hard and scabrid. The figure might be intended possibly for *F. glomerata*, Willd. A specimen in Herb. Kew from Rottler's herbarium (consisting of 3 leaves only), named *F. racemosa*, bearing the notes "fructib. edulibus" and "cum Rheede i. fig. 25, bene quadrat," belongs to *F. glomerata*, Willd.

F. ramea, Wall. Cat. 4556. The specimens of this in the Wallichian Herbarium are attributed to Sylhet. But the specimens and a drawing in the Calcutta Herbarium thus named by Wallich himself are all *F. rubra*, Lamk., a plant received from the island of Bourbon and for many years cultivated in the Botanic Garden, Calcutta.

F. reflexa, Thunbg. Diss. Fic. 11, No. 16. I do not know what this can be.

F. reticulata, Thunbg. Fic. 12; Vahl. Enum. ii. 199, is probably *F. rostrata*, Lamk.

F. retusa, Linn., var. *macrocarpa*, Kurz. This variety is probably a distinct species; but in the absence of good specimens I cannot identify it.

F. rhynchophylla, Wall. Cat. 4487 = *F. religiosa*, Linn.

F. rotundifolia, Roxb Fl. Ind. iii. 556. I have seen nothing bearing this name. It is possibly one of the forms of *F. heterophylla*, Linn. fil.

F. rupestris, Bl. Bijdr. 439, indeterminable; founded on a fruitless branch.

F. sagittata, Vahl. Enum. ii. 185. I have seen no specimen of this; it is probably founded on a young shoot of *F. ramentacea*, Roxb., or *F. villosa*, Bl.

F. sarmentosa, Herb. Ham. No. 4533C in Wall. Cat. = *F. scandens*, Roxb.

F. sclerocoma, Miq. Pl. Jungh. 58; Fl. Ind. Bat. i. pt. 2. 302. Except the type specimen at Utrecht, which consists of two separate leaves and two separate receptacles, I have seen nothing bearing this name. Miquel himself says that it is near *scabrella*, Roxb.; and the fragments which form the type bear this out. *F. scabrella*, Roxb., itself is in my opinion only a form of *F. heterophylla*, Linn. fil.

F. rubra, ? Vahl, Blume in Bijdr. 453. I have seen no specimen of this. Doubtless it has been described under some other name. Blume's description is too brief for identification. *F. rubra*, Lamk., is an African plant.

Covellia rufescens, Kurz, is apparently *F. Vrieseana*, Miq.

F. serpyllifolia, Bl. Bijdr. 443, is founded on a fragment of some creeping species.

F. simplicissima, Lour. Fl. Cochin China ii. 821; Miq. in Lond. Journ. Bot. I have not seen any specimen with this name.

F. stipulata (not of Thunbg.), Wall. Cat. 4574 = *F. punctata*, Thunbg.

F. stipulosa, Miq. Ann. Mus. Lugd. Bat. iii. 287; *Urostig. stipulosum*, Miq. Lond. Journ. Bot. vi. 568. A species founded on Cuming's Philippine specimens (No. 1978), which I should unhesitatingly refer to *F. infectoria*, Roxb., var. *caulocarpa* (*supra*, p. 63).

F. stupenda, Miq. Ann. Mus. Lugd Bat. iii. 286.—*Urost. giganteum*, Miq. in Zoll. Syst. Verz. 90, 96; Fl. Ind. Bat. i. pt. 2. 351. This species is founded on Zollinger's Herbarium specimen No. 1676, which he says he collected from a very large tree growing at the base of the Salak mountain, near Buitenzorg, in Java. The type specimen, which is at Utrecht, consists of leaves only. It is named *Urostig. giganteum*, Miq. But Miquel himself subsequently changed this to *F. stupenda*. A young plant under the earlier name is cultivated (1884) in the Botanic Garden at Utrecht It has not produced receptacles, and is not likely to do so.

F. subcordata, Bl. Bijdr. 440; Miq. in Ann. Mus Lugd. Bat. iii. 287 (sub *Urostig.*); Miq. in Fl. Ind. Bat. i. pt. 2. 349. I have seen only one specimen of this at Leiden, and it consists of a few loose leaves, which in nervation and texture resemble those of *F. nemoralis*, Wall., but are broader in shape and not narrowed at the base.

F. sub-cuneata, Miq. in Ann. Mus. Lugd. Bat. iii. 235, 297. This is known only by a few imperfect specimens in the Leiden and Calcutta Herbaria, collected in Halmaheira and Ceram.

F. sub-pedunculata, Miq Ann. Mus. Lugd. Bat. iii. 293.—*Pogonotrophe Wightiana*, Miq. Lond. Journ. Bot. vii. 74. Miquel described two plants under the name *F. pedunculata*. One, a Urostigma, I have reduced to *F. glabella*, Bl. (*supra*, p. 49). The second Miquel put into his sub-genus *Pogonotrophe*. He says it is Indian, and near *F. macrocarpa*, Wight, and *vagans*, Wight; but I have seen no specimens, and cannot form an opinion as to what it may be.

F. sub-subulata, Miq. Ann. Mus. Lugd. Bat. iii. 225, 292. I have never seen this, there being no specimen in the Herbaria at Leiden or Utrecht. From Miquel's description I gather that this is probably a small form of *F. subulata*, Bl.

F. suborna, Ham. MSS. = *F. elastica*, Roxb.

F. subrepanda, Wall. Cat. 4568. Sheet B is probably referable to *F. infectoria*, Roxb. Sheet A (*supra*, p. 20) = *F. mysorensis*, Heyne, var. *sub-repanda*.

F. superstitiosa, Link. (name only), said by Miquel to be *F. religiosa*, Linn.

F. symphytifolia, Lamk., probably = *F. hispida*, Linn. fil.

F. Tabing, Miq. Fl. Ind. Bat. Suppl. 430, from Sumatra is described from imperfect materials.

F. Tampang, Miq. Fl. Ind. Bat. Suppl. 173, 425; Ann. Mus. Lugd. Bat. 290. This is a species of *Artocarpus*, as the young fruit on Miquel's type specimen at Utrecht clearly shows. (See Ann. Bot. Gard. Calc. ii. 8, 15.)

F. tenax, Bl. Bijdr. 440. Described imperfectly by Blume as an introduction from China: probably = *F. pumila*, Linn.

F. terminalis, Roth. I have seen no specimens. Miquel reduces doubtfully to *F. Altimeraloo*, Roxb., which = *F. gibbosa*, Bl., var. *cuspidifera*.

F. Ternatana, Miq. in Ann Mus. Lugd. Bat. iii. 296.—*Covellia ternatana*, Miq. Fl. Ind. Bat. i. pt. 2. 324. There is an imperfect specimen of this from Ternate in the Herbarium at Utrecht. It is probably *F. rudis*, Miq.

F. Timorensis, Dcne. (not of Miq.). This is reduced by Miquel (Ann. Mus. Lugd. Bat. iii. 287) to *F. superba*, Miq. I have never seen a specimen.

F. Timorensis, Miq. (sub *Urostig.*) Ann. Mus. Lugd. Bat. iii. 286.—*Urostig. Timorensis*, Miq. Lond. Journ. Bot. vi. 569; Fl. Ind. Bat. i. pt. 2. 343. This is probably *F. infectoria*, Roxb., var. *caulocarpa* (*supra*, p. 63).

F. tonsa, Miq. Ann. Mus. Lugd. Bat. iii. 234, 297. In the collections at Leiden and Utrecht are a few leaves from the Celebes thus named. These leaves appear to belong to a species near *F. fistulosa*, Reinw.

F. trichocarpa, Bl. Bijdr. 458; Miq. (sub *Urostig.*). Dcne. in N. Ann. du Mus. iii. 497; Miq. Fl. Ind. Bat. i. pt. 2. 338; Ann. Mus. Lugd. Bat. iii. 286. There is no specimen bearing this name in the Herbaria of Kew, Leiden, Utrecht, or Calcutta. In the Buitenzorg Herbarium there are leaf specimens so named, but they really belong to *F. lepicarpa*, Bl. From Blume's and Decaisne's descriptions this appears not to be a *Urostigma*, in which sub-genus, however, Miquel places it. Miquel does not appear to have seen a specimen, but to have drawn up his description in Fl. Ind. Bat. l. c. from Blume's and Decaisne's. Blume got the specimen on which he founded the species from the mountain Pangarango in Java, a locality that has frequently been collected over since Blume's day. Blume's original specimens having been lost, I suspect the species has been re-named. Decaisne's description was written on specimens brought from Timor.

F. Tsjela, Herb. Ham. Wall. Cat. 4520, is *F. infectoria*, Roxb.

F. ulmifolia, Lamk. Encyc. ii. 499; Vahl. Enum. ii. ·197. I have seen no authentic specimen of this. Miquel in Fl. Ind. Bat. i. pt. 2. 299 gives a description of this, but apparently without having seen it, and his description does not agree with Lamarck's. Both Lamarck's and Vahl's descriptions answer for the Australian plant subsequently named *F. aspera* by Forster. On the type sheet of *F. brevicuspis*, Miq., in the Herbarium at Utrecht, "*F. ulmifolia*, Lamk." has been written by an unknown hand.

F. undulata, Ham. in Linn. Trans. xv, 133. Miquel identifies with *F. nervosa*, Heyne.

F. urticæfolia, Roxb. Fl. Ind. iii, 553. Roxburgh's description of this is too meagre for identification, and he has left no drawing of it.

F. vestita, Wall. Cat. 4500. Although mentioned in the catalogue, this is absent from all the sets of the Wallichian collection.

F. (sub. *Urostig.*) *virgata*, Miq. Fl. Ind. Bat. i. pt. 2. 342. The plant described by Miquel under this name is not *F. virgata*, Reinw., as Miquel at one time thought. Miquel subsequently discovered his error. I do not know what Miquel's *Urostigma virgatum* is, as there is no specimen of it either at Leiden, Utrecht, or Kew, and the only specimens I have seen from Buitenzorg have no receptacles. Reinwardt's *virgata* is *F. subulata*, Bl. (*supra*, p. 8).

F. (*Urostig.*) *volubile*, Dalz. and Gibs, Fl. Bomb. 242, was afterwards (l. c. 315) identified by its authors as a scandent form of *Urostigma ampelos*, Dalz. and Gibs. (*Ficus ampelos*, Koenig MSS.). Now *F. ampelos*, Koenig MSS., as described by Roxburgh (Fl. Ind. iii. 553), is not the true *F. ampelos* of Burmann, which does not occur in Peninsular India. It is the scandent variety *parasitica* of *F. gibbosa*, Bl., a plant rather common in Southern and Western India.

F. (*Pogonot.*) *Wightiana*, Miq. Lond. Journ Bot. vii. 74. Miquel subsequently reduced this (Ann. Mus. Lugd. Bat. iii. 293) to *F. sub-pedunculata*, Miq., which in my opinion is = *F. glabella*, Bl.

F. Wassa, Roxb. Fl. Ind. iii. 539; Wight Ic. 666; Miq. Fl. Ind. Bat. i. pt. 2. 298; Ann. Mus. Lugd. Bat. iii 271, 291. Roxburgh originally described this species from a specimen received from the Moluccas and cultivated in the Botanic Garden, Calcutta. A copy of his figure of it was published by Wight, but no specimen of the species exists. Roxburgh himself considered his *F. Wassa* as probably the plant figured by Rumphius, Herb. Amb. iii. t. 94. From Rumphius' and Roxburgh's own figures, I should think *F. Wassa*, Roxb. is probably a *Covellia*. Miquel suggests this in Fl. Ind. Bat. l. c.; but in his final revision of *Ficus* in Ann. Mus. Lugd. Bat., he suggests the reduction of *F. Wassa*, Roxb., to the quite as obscure species *F. difformis*, Lamk.

F. (*sub. Urost.*) *Zollingeriana*, Miq. Ann. Mus. Lugd. Bat. iii. 264, 287. A plant from Western Java which, judging from the imperfect specimens so named in the Dutch Herbaria, must be near, if not identical with, *F. Sumatrana*, Miq.

INDEX.

Synonyms, vernacular names, and the names of little known and doubtful species, are in italics.

Arbor conciliorum 54, 55
Arealu 55
Banyan 18
Bo-tree 56
Boekoe Boekoe 118, 119
Bosscheria Minahassæ, Teysm.. et de Vriese 108
Caprificus Amboinensis, Rumph. 169
COVELLIA 2, 97
,, *albipila*, Miq. ... 179
,, *Assamica*, Miq. ... 117
,, *aurata*, Miq. ... 151
,, *composita*, Miq. ... 120
,, *congesta*, Miq. ... 180
,, *conglomerata*, Miq. ... 101
,, *Courtallensis*, Miq. ... 117
,, *cuneata*, Miq. ... 110
,, *cunia*, Miq. ... 101
,, *cyrtophylla*, Miq. ... 82
,, *dæmonum*, Dalz. and Gibs. 117
,, *dasycarpa*, Miq. ... 81, 117
,, *didyma*, Miq. ... 118
,, *glomerata*, Miq. ... 173
,, *grandifolia*, Miq. ...119, 120
,, *Griffithii*, Miq. ... 76
,, *guttata*, Wight ... 167
,, *hispida*, Miq. ... 117
,, *inequilobia*, Miq. ... 101
,, *lanceolata*, Miq. ... 177
,, *leucopleura*, Miq. ... 119
,, *lepicarpa*, Bl. ... 118
var. *Bungeng* ... 118
,, *macrophylla*, Miq. ... 168
,, *microcarpa*, Miq. ... 110
,, *mollis*, Miq. ... 173
,, *oppositifolia*, Gasp. ... 117
,, *oppositifolia*, Miq. ... 117
,, *paniculata*, Miq. ... 110
,, *prostrata*, Miq. ... 105
,, *racemifera*, Miq. ... 169
,, *radiata*, Miq. ... 119
,, *rapiformis*, Miq. ... 119
,, *ribes*, Miq. ... 110
,, *rufescens*, Kurz ... 184
,, *setulosa*, Miq. ... 117
,, *stictocarpa*, Miq. ... 119
,, *sub-denticulata*, Miq. 82
COVELLIA *sub-opposita*, Miq. ... 114
,, *Ternatana*, Miq. ... 185
,, *Timorensis*, Miq. ... 63
,, *tuberculata*, Miq. ... 114
,, *umbonata*, Miq. ... 91
,, *venosa*, Miq. ... 119
,, *volkameriæfolia*, Miq. 118
,, *Wightiana*, Miq. ... 117
,, *Zollingeriana*, Miq. ... 81
Cystogyne leucosticta, Gasp. ... 119
EUSYCE 2
Erythrogyne frutescens, Visian. ... 139
,, *lutescens* 139
Erythroxylon Burmanicum, Griff. 111
Ficus *abbreviata*, Wall. ... 179
,, *Abelii*, Miq. ... 157
,, acamptophylla, Miq. ... 40
,, acidula, King ... 176
,, *acuminata*, Herb. Kew et Wall. Cat. ... 86
,, *acuminata*, Kunth et Bouché ... 86
,, acuminata, Roxb. ... 8
,, *acuminata*, Bot. Mag. ... 10, 11
,, *acuminatissima*, Miq. ... 4
,, *acutiloba*, Miq. ... 76
,, adenosperma, Miq. ... 7
,, *adhærens*, Miq. ...135, 136
,, *adnascens*, Wall ...131, 132
,, *ægeirophylla*, Miq. ... 62, 63
,, *affinis*, Wall. ... 49, 50
,, *affinior*, Griff. 55, 56, 62
,, alba, Reinw. ...147, 143
,, *albinervia*, Miq. ... 179
,, *albipila*, Miq. ... 179
,, allutacea, Bl. ... 131
var. Teysmannia ... 131
,, *alnifolia*, Miq. ... 130
,, *altimeeraloo*, Roxb. MSS, 5, 120
,, *Altimeraloo*, Rumph. ... 6
,, *alternans*, Wall. ... 179
,, altissima, Bl. ... 30
var. Fergussoni, King ... 31
,, *amara*, Noronh ... 179
,, *amblyphylla*, Miq. ... 179
,, *Americana*, Pluk. ... 18
,, ampelas, Burm. ... 90
,, *ampelos*, Koen 6
Ficus *ampelos*, Lamk. 179
,, *ampla*, Kunth et Bouché 179
,, *amplissima*, Miq. ... 179
,, *ampullacea*, Wight MSS. 179
,, *anastomosans*, Wall. ... 77
,, *ancolana*, Miq. ... 8
,, *angulidens*, Miq. ... 80
,, *angustata*, Miq. ... 179
,, *angustifolia*, Roxb. ... 37
,, *angustifolia*, Bl. ... 88
,, *angulata*, Miq. ... 6
,, annulata, Bl. ... 25
var. flavescens, King... 26
var. valida, King ... 26
var. *Runnut*, Miq. ... 27
,, *anonæfolia*, *Zipp.MSS.* ... 4
,, *aperta*, Wall. ... 179
,, apiocarpa, Miq. ... 70
,, *apiculata*, Miq. ...148, 179
,, *aquatica*, Koenig ... 76
,, araneosa, King ... 136
,, Arfakensis, King ... 104
,, *arguta*, Wall. ... 151
,, Arnottiana, Miq. ... 56
var. Courtallensis ... 56
,, *artocarpifolia*, Roxb. ... 64
,, Aruensis, King ... 175
,, *asinina*, Ham. 20, 22, 23
,, asperior, Miq. ... 91
,, *asperiuscula*, Kunth et Bouché ... 81
,, asperrima, Roxb. ... 80
,, *Assamica*, Miq. ... 76
,, *ataktophylla*, Miq. ... 145
,, *aurata*, Miq. ... 151
,, aurantiaca, Griff. ... 67
,, *aurantiaca*, Noronh. ... 179
,, *aurantiaca*, Miq. ...143, 164
,, *aurantiaca*, Wall. ... 37
,, *auriculata*, Lour. ... 179
,, aurita, Reinw. ... 8
,, *Backhousei*, Miq. ... 179
,, Balica, Miq. ... 84, 155
,, *bandana*, Miq. ... 90
,, *barbata*, Wall. ... 137
,, *basidentula*, Miq. ... 179
,, Beccarii, King ... 102
,, Beddomei, King ... 26

Ficus *Beecheyana*, Hook. and Arn. 141
,, *begoniæfolia*, Wall. ... 180
,, *begoniæfolia*, Teysm. MS. 79
,, Bengalensis, Linn. ... 18
,, Benjamina, Linn. ... 43
var. comosa, King ... 44
,, *Benjamina*, Wall. ... 59
,, *Benjamina*, Willd. ... 50
,, *Benjaminea*, Thunbg. ... 180
,, Bhotanica, King ... 75
,, *bicolor*, Herb. Hook. ... 147
,, *biglandula*, Bl. ... 77
,, *biglandulosa*, Wall. ... 180
,, *biglandulata*, Miq. ... 77
,, *binata*, Wall. ... 162
,, Binnendykii, Miq. ... 41
,, *bistipulata*, Griff. ... 37, 180
,, *biverucellum*, Miq. ... 26
,, botryocarpa, Miq. 107, 176
,, brachiata, King ... 106
,, bracteata, Wall ... 23
,, brevicuspis, Miq. ... 84, 155
,, *brevipes*, Miq. ... 811
,, callicarpa, Miq. ... 69, 127
,, *caloneura*, Kurz ... 180
,, callophylla, Bl. ... 52
,, callosa, Willd. ... 64
,, *cannabina*, Lour. ... 180
,, Carica, Linn. ... 147
,, *caricoides*, Roxb. ... 146
,, caudata, Wall. ... 87, 154, 162
,, *caudata*, Herb. Hook. Thoms. ... 89
,, caudiculata, Trim. ... 48
,, *caulobotrya*, Miq. ... 57
,, *caulocarpa*, Miq. ... 63, 106
,, Celebica, Bl. ... 12
var. Kunstleri ... 12
,, *cerasiformis*, Desf. ... 10, 11
,, *cerifera*, Miq. ... 169
,, *ceriflua*, Jungh. ... 169
,, *Ceylanica*, Miq. ... 128
,, *Championi*, Benth. ... 65
,, chartacea, Wall. ... 159
var. torulosa ... 159
,, *chincha*, Roxb. ... 6, 87
,, *Chittagonga*, Miq. ... 173
,, *Chittagonga*, Hook. fil. and Th. 62
,, chlorocarpa, Benth. ... 169
,, *chloroleuca*, Miq. .. 180
,, *chlorocarpa*, Miq. ... 148
,, *chrysocoma*, Bl. ... 21
,, chrysocarpa, Reinw. ... 151
,, chrysolepis, Miq. ... 24
,, *chrysophthalma*, Miq. ... 180
,, *cinerascens*, Thw. ... 64
,, *cinerascens*, Wall. ... 180
,, *citrifolia*, Willd. ... 19
,, clavata, Wall. ... 87, 154
Ficus *clavifructus*, King MSS. 162
,, Clarkei, King .. 175
,, clusioides, Miq. ... 42
,, Comitis, King ... 156
,, *comosa*, Roxb. ... 43
,, *compressicaulis*, Bl. ... 180
,, *concentrica*, Van Hasselt MSS. 10
,, *concinna*, Miq. ... 50
,, *condaravia*, Ham. ... 180
,, condensa, King ... 113
,, *congesta*, Roxb. .. 180
,, conjugata, Miq. ... 79
,, conglobata, King ... 99
,, *conglomerata*, Roxb. ... 101
,, conora, King ... 103
,, consociata, Bl. ... 33
var. Murtoni, King ... 34
,, conspicabilis, King ... 80
,, copiosa, Steud. ... 85, 155
var. muriculata ... 86
,, *cordifolia*, Dalz. and Gibs. 56
,, *cordifolia*, Roxb. ... 54, 55
,, *cordifolia*, Bl. ... 180
,, *coriacea*, Ait. ... 180
,, *cornifolia*, Kunth et Bouché .. 180
,, *coronata*, Colla ... 180
,, *coronata*, Reinw. ... 81
,, *costigera*, Miq. ... 180
,, *cotoniæfolia* ... 19
,, *Courtallensis*, Miq. ... 56
,, *crassinervia*, Hort. Berol. 181
,, *crassiramea*, Miq. ... 36
,, *crenulata*, Hassk. ... 181
,, crininervia, Miq. ... 138
,, *crustacea*, Wall. ... 129
,, cucurbitina, King ... 22
,, Cumingii, Miq. ... 92
,, cuneata, Miq. ... 110
,, *cuneata*, Wall. .. 181, 111
,, *cuneata*, Bl. ... 5
,, cunia, Ham. ... 101
var. conglomerata ... 101
,, Cunninghami, Miq. ... 50
,, cuspidata, Reinw. .. 88, 154
var. sinuata ... 89
,, *cuspidifera*, Miq. ... 6
,, cycloneura, Miq. ... 31
,, *cyrtophylla*, Wall. ... 82
,, D'Albertisii, King ... 172
,, *dæmonum*, Zoll. et Mor. 181
,, *dæmona*, Koen. ... 116
,, Dalhousiæ, Miq. ... 16
,, Decaisneana, Miq. ... 6
var. trematocarpa ... 7
var. firmula ... 7
,, decipiens, Reinw. ... 93
,, *deltoidea*, Jack. ... 139
,, *densa*, Miq. ... 161
Ficus *densiserra*, Miq. ... 151
,, *denticulata*, Vahl ... 76
,, *denticulata*, Ham. ... 181
,, *depressa*, Bl. ... 24
,, *dictyophylla*, Wall. ... 43
,, *dichrotrix*, Miq. ... 181
,, *Diepenhorstii*, Miq. ... 181
,, *difformis*, Lamk.? ... 5
,, *difformis*, Lamk. ... 181
,, *dilatata*, Miq. ... 50, 51
,, *dimidiata*, Wall. ... 181
,, dimorpha, King ... 111
,, *diphylla*, Wall. ... 114
,, *discolor*, Miq. ... 181
,, disticha, Bl. ... 126
,, *disticha*, Thw. ... 125
,, diversifolia, Bl. 139, 164, 159, 51
var. ovoidea ... 140
var. Kunstleri ... 140
var. lutescens ... 140
,, *diversifolia*, Reinw. ... 5
,, *diversiformis*, Miq. ... 125
,, *dives*, Miq. ... 137
,, *drupacea*, Thunbg. ... 181
,, dubia, Wall. 46
,, dumosa, King ... 151
,, duriuscula, King ... 155
,, *eburnea*, Hort. ... 120
,, excavata, King ... 127
,, elastica, Roxb. ... 45
,, *elegans*, Hassk. ... 146
,, *ellipsoidea*, Miq. ... 181
,, *elliptica*, Miq. ... 126
,, *elongata*, Miq. ... 76
,, *emodi*, Herb. Hook. fil. and Th. ... 128
,, *Emodi*, Wall. ... 181
,, erecta, Thunbg. 141, 133, 154, 161
var. Sieboldi ... 142
var. Beecheyana ... 142
,, *erythrosperma*, Miq. ... 181
,, *euphylla*, Kurz ... 47
,, *exasperata*, Wall. .. 76
,, *exasperata*, Roxb. ... 91, 4
,, excavata, King ... 127
,, *excelsa*, Miq. ... 181
,, *excelsa*, Wall. ... 5, 6
,, *excelsa*, Vahl? ... 5, 181
,, *falcata*, Thunbg. ... 68
,, *fallax*, Miq. ... 88, 181
,, *Fieldingii*, Wall. ... 161
,, *filiformis*, Bl. ... 181
,, *Finlaysoniana*, Wall. ... 157
,, fistulosa, Reinw. ... 114
,, *fistulosa*, Kurz ... 106
,, *firma*, Wall. ... 27
,, *firmula*, Miq. ... 6, 7
,, *flavescens*, Bl. ... 25
,, Forbesii, King ... 109
,, Formosana, Maxim. ... 153, 141

Ficus Forstenii, Miq. ... 29
,, foveolata, Wall. ... 133
var. Nipponica ... 134
var. impressa ... 134
var. Thunbergii ... 134
var. oleæformis ... 134
var. maliformis ... 134
,, *fraterna, Miq.* ... 37
,, *fruticosa*, Roxb. ... 129
,, fulva, Reinw. 148, 157
var. minor ... 149
,, garciniæfolia, Miq. ... 43
,, *Gasparriniana*, Miq. ... 181
,, *Gelderi*, Miq. ... 39
,, gemella, Wall. ... 161
,, *geminifolia*, Miq. ... 114
,, geniculata, Kurz ... 64
,, geocarpa, Teysm. ... 102
var. uncinata ... 102
,, gibbosa, Bl. ... 4
var. cuspidifera ... 6
var. parasitica ... 6
var. tuberculata ... 6
,, *Gilapong*, Miq. ... 85
,, glaberrima, Bl. ... 37
,, glandulifera, Wall. 143, 164
,, glabella, Bl. ... 41, 49
var. affinis ... 50
var. concinna ... 50
var. Papuana ... 50
,, glomerata, Roxb. ... 173, 62
var. Chittagonga ... 174
var. Miquelii ... 174
var. mollis ... 174
var. elongata ... 174
,, *glomerata*, Wall. ... 181
,, *glomerata*, Hort. Buitenz. 169
,, globosa, Bl. ... 27, 39
var. Manok, King ... 27
,, glumosa, Caile Delile ... 23
,, *gonia*, Ham. ... 19
,, *Gooleria*, Roxb. ... 174
,, *gossypina*, Wall. ... 147
,, *gracilis*, Wall. ... 181
,, grandis, King ... 170
,, *grandifolia*, Wall. ... 10, 11
,, *grewiæfolia*, Bl. ... 3, 90
,, *grewiæfolia*, Hort. Berol. 81
,, *grisea*, Wall. ... 181
,, *grossinervis*, Miq. ... 138
,, *grossivenis*, Miq. ... 181
,, *grossularia*, Herb. Ham. 182
,, *grossularioides*, Burm. ... 76
,, *Guillielmi I*, De Vriese ... 67
,, *gummiflua*, Miq. ... 169
,, guttata, Wight ... 167
,, *hæmatocarpa*, Bl. ... 43
,, *Hamiltoniana*, Wall. ... 171
,, *Hanciana*, Maxim. ... 124
,, *haplophylla*, Kurz ... 182
Ficus Harlandi, Benth. ... 113
,, *hederacea*, Roxb. ... 129
,, Hemsleyana, King ... 112
,, Henrici, King ... 174
,, heterophylla, Linn. fil ... 75
var. scabrella ... 76
var. repens ... 77
,, *heteropleura*, Bl. ... 86
,, heteropoda, Miq. ... 78
,, *hibiscifolia*, Champ. ... 149
,, *hirsuta*, Wall. ... 137
,, *hirsuta*, Roxb. ... 150
,, hirta, Vahl ... 149
var. Roxburghii ... 150
,, hispida, Linn. fil ... 116
,, *hispidissma*, Wight MSS. 80
,, Hookeri, Miq. ... 36
,, *Hullettii*, King MSS. ... 114
,, *humilis*, Roxb. ... 77
,, *Hunteri*, Miq. ... 182, 147
,, hypogæa, King ... 100
,, *hypsophila*, Miq. 182, 4, 81
,, *impressa*, Benth. ... 133
,, *incisa*, Wall. ... 182
,, *inclinata*, Wall. ... 182
,, *inconstans*, Miq. ... 77
,, *inconstantissima*, Miq. ... 182
,, Indica, Linn. 39, 18, 19
var. Gelderi, King ... 39
,, *Indica*, L. var. B. ... 59
,, *Indica*, Willd. var. B. ... 59, 60
,, *Indica*, Lamk. ... 182
,, infectoria, Roxb. ... 60
var. Lambertiana ... 63
var. Wightiana ... 63
var. Forbesii ... 63
var. caulocarpa ... 63
,, *infectoria*, Willd. ... 57
,, insignis, Kurz ... 58
,, *insularis*, Miq. ... 182, 9
,, involucrata, Bl. ... 34
,, irregularis, Miq. ... 92
,, *ischnopoda*, Miq. ... 157, 134
,, *Japonica*, Bl. ... 141
,, *Javensis*, Miq. ... 90
,, juglandiformis, King ... 28
,, Junghuhniana, Miq. ... 10, 11
,, kallicarpa, Miq. ... 69
,, *Karet* ... 45
,, Korthalsii, Miq. ... 33
var. Beccariana, King ... 33
,, Kurzii, King ... 47
,, *laccifera*, Roxb. ... 30
,, *lachnocaula*, Miq. ... 182
,, *lacor*, Ham. ... 60, 61
,, *læta*, Decais. ... 6
,, lævis, Bl. ... 128
var. dasyphylla ... 128
var. tomentosa ... 128
var. Assamica ... 128
Ficus *Lambertiana*, Miq. ... 62, 63
,, *laminosa*, Hardw. ... 115
,, *lamponga*, Miq. ... 163, 159
var. *Martabanica* ... 163
var. *chartaca* ... 159
,, lanata, Bl. ... 137
,, lanceolata, Ham. ... 177
,, *lancifolia*, Miq. ... 12
,, lanigera, Wall. ... 138
,, lasiocarpa, Miq. .. 9
,, *lasiophlebia*, Miq. ... 9
,, *lasiophylla*, Lamk. ... 182
,, *lateritia*, Wall. ... 20
,, lepicarpa, Bl. ... 118
,, lepidosa, Wall. ... 163
var. Martabanica ... 163
,, *leptocarpa*, Steud ... 135
,, leucantatoma, Poir. ... 119, 61
,, *leucocarpa*, Miq. 60, 62, 174
,, *leucoma*, R. & S. ... 119
,, *leucoma*, Miq. ... 143
,, *leucopleura*, Bl. ... 119
,, leucoptera, Miq. ... 157
,, *leucoxylon*, Miq. ... 4
,, *littoralis*, Bl. ... 50
,, *Lobbii*, Miq. ... 86
,, *longifolia*, Wall. ... 182
,, *longifolia*, Ham. ... 39, 42
,, Lowii, King ... 32
,, *ludens*, Wall. ... 133
,, *Luducca*, Roxb. ... 133, 134
,, *luscescens*, Bl. ... 60, 62
,, *lutescens*, Desp. ... 139, 140
,, macilenta, King ... 155
,, Maclellandi, King ... 52
,, macrocarpa, Wight ... 166, 129
,, *macrocalyx*, Miq. ... 34
,, *macrocarpa*, Bl. ... 68
,, *macrophylla*, Roxb. ... 168
,, macropoda, Miq. ... 144
,, *macropoda*, Kurz ... 182, 86
,, Madurensis, Miq. ... 83, 155
,, magnifolia, Mull. ... 155
,, *magnoliæfolia*, Bl. ... 53
,, *Malabarica*, Miq. ... 182
,, *Manok*, Miq. ... 27, 38
,, *Mappan*, Miq. ... 147
,, *Martabanica*, Wall. ... 163
,, melinocarpa, Bl. ... 94
,, *menadana*, Miq ... 182
,, mespiloides, King ... 83
,, *microcarpa*, Bl. ... 135, 136
,, *microcarpa*, Linn. fil. ... 50
,, microstoma, Wall. ... 38
,, *microtus*, Miq. ... 4
,, *Millesii*, Miq. ... 157
,, *Millettii*, Miq. ... 157
,, Minahassæ, Miq. ... 108
,, Miquelii, King . 106, 63
,, *modesta*, Miq. ... 53

INDEX.

Ficus *mollis*, Vahl ... 22, 23
,, *mollis*, Willd. ... 116
,, *mollis*, Miq. ... 173
,, *montana*, Burm. ... 77
,, *montana*, Wall. ... 53
,, *monticola*, Miq. ... 182
,, Mooniana, King ... 57
,, *morifolia*, Vahl ... 182
,, Moseleyana, King ... 144
,, Mottleyana, Miq. ... 158
,, *muriculata*, Miq. ... 85
,, myriocarpa, Miq. ... 107
,, Mysorensis, Heyne ... 19
  var. pubescens 20
  var. subrepanda ... 20
,, *neglecta*, Bl. ... 43
,, *neglecta*, Dcne. ... 182
,, nemoralis, Wall. ... 161
  var. trilepis ... 162
  var. gemella ... 162
  var. Fieldingii ... 163
,, *Nepalensis*, Spreng. ... 183
,, nervosa, Heyne ... 53
,, ,, var. minor ... 53
,, *nesophila*, Mull. ... 50
,, nigrescens, King ... 78
,, *nipponica*, Fr. and Sav. ...133, 136
,, *nitida*, Thunbg. ... 50
,, *nivea*, Bl. 147
,, nodosa, Teysm. and Binn. 167
,, nuda, Miq. 43
,, *var. macrocarpa*, Kurz 47
,, *nuda*, Kurz 183
,, *obliqua*, Miq. ... 94
,, *oblongifolia*, Don. ... 183
,, obpyramidata, King ... 116
,, obtecta, Wall. ... 137
,, obtusa, Hassk. ... 130
,, obtusidens, Miq. ... 86
,, obtusifolia, Roxb. ... 42
,, obscura, Bl. ... 81
,, Odoardi, King ... 156
,, *Oldhami*, Hance 119, 120
,, oleæfolia, King ... 160
  var. major ... 160
,, oligoneura, Miq. ... 140
,, *oligodon*, Miq. ... 171
,, *oligosperma*, Miq. ... 135
,, *onusta*, Wall. ... 27, 39
,, *oppositifolia*, Willd. ... 116
,, *ovata*, Don 183
,, *ovoidea*, Jack. 51, 139, 140
,, *oxyphylla*, Miq. ... 183
,, pachyphylla, King ... 32
,, *padana*, Burm. ... 146
,, *pallida*, Wall. ... 183
,, palmata, Forsk. ... 146
,, *palmata*, Roxb. ... 147
,, pandurata, Hance ... 141
,, *papyrifera*, Griff. ... 43

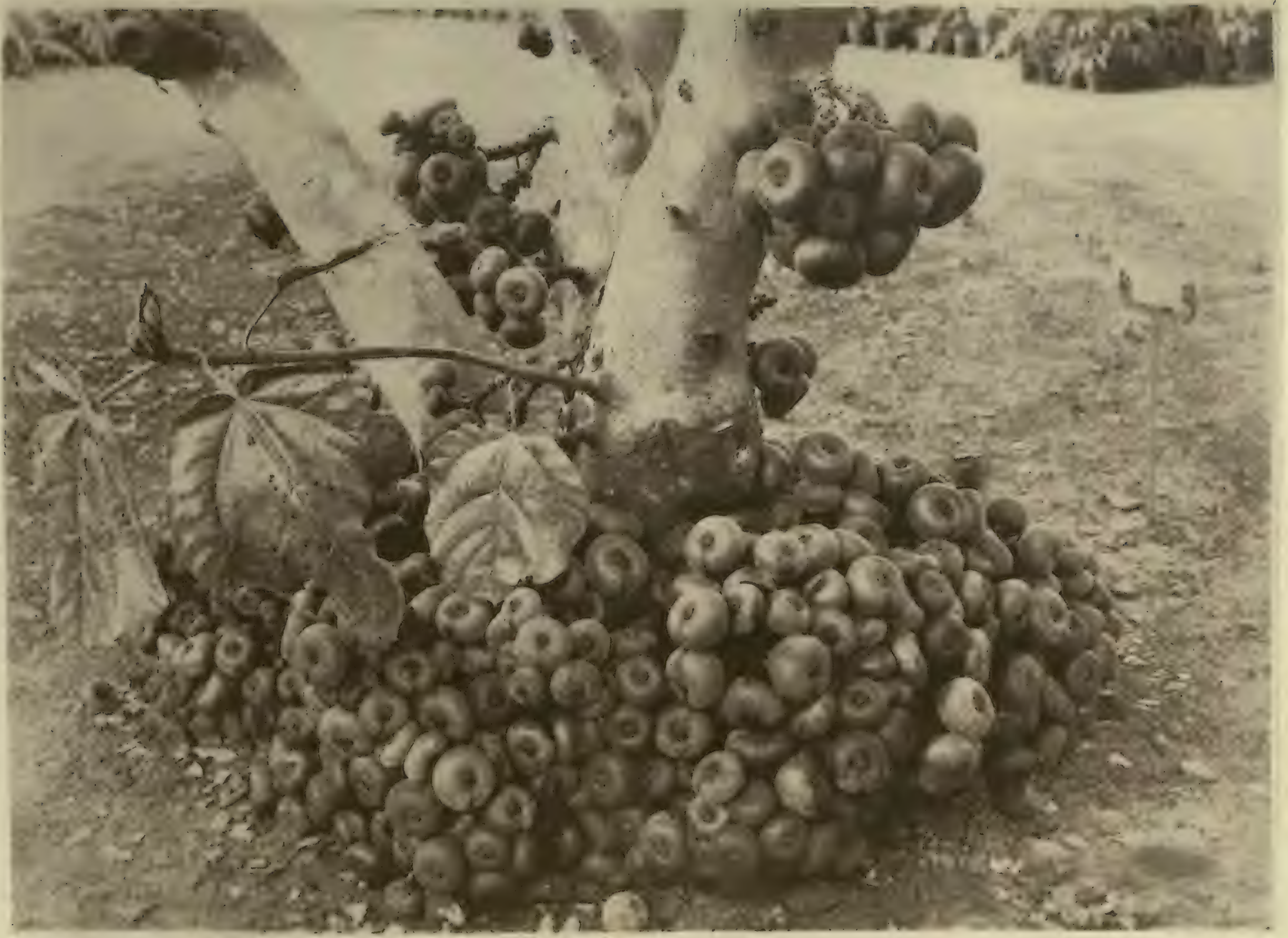
Ficus *paradoxa*, Bl. ... 5
,, *parasitica*, Koen. ... 6
,, parietalis, Bl. ... 10
,, *parietalis*, var. *ovalis*, Bl. 86
,, *parvifolia*, Miq. ... 49, 50
,, pauper, King ... 160
,, *pedicellata*, Wall. ... 182
,, pedunculosa, Miq. ... 145
,, *peduncularis*, Wall. ... 145
,, *Peguensis*, Ham. ... 30
,, *pellucida-punctata*, Griff. 39
,, *peltata*, Bl. ... 183
,, *pendula*, *Link*. ... 43
,, *perseæfolia*, Miq. ... 63
,, *pervia*, Miq. 6
,, *Philippensis*, Miq. ... 6
,, *phlebophylla*, Miq. ... 10, 11
,, *picta*, Noronh. ... 183
,, pilosa, Reinw. ... 21
  var. chrysocoma ... 21
,, *piperifolia*, Miq. ... 130
,, pisifera, Wall. ... 3, 82
,, pisocarpa, Bl. ... 48, 49
,, *platycaula*, Miq. ... 130
,, *politoria*, Lamk. ... 90
,, *politoria*, Moon. ... 80
,, *polycarpa*, Roxb. ... 85
,, *polycarpa*, Herb. Ham. ... 171
,, pomifera, Wall. ... 171
,, *pomifera*, Kurz ... 69
,, populifolia, Vahl ... 56
,, *populifolia*, Wall ... 56
,, *populiformis*, Schott MSS. 183
,, *populnea*, Kunth et Bouché. ... 183
,, polycarpa, Wall. ... 110
,, procera, Reinw. ... 35
  var. crassiramea, King 36
,, *prominens*, Wall. ... 116
,, prostrata, Wall. ...105, 110
,, pruniformis, Bl. ... 24
,, *pseudo-Benjamina*, Miq. 59
,, *pseudo-rubra*, Miq. ... 39
,, *pseudo-sycomorus*, Dec. ... 146
,, *pseudo-Tjiela*, Miq. ... 56
,, *pubescens*, Roth. ... 20, 23
,, *pubigera*, Wall. ... 133
,, *pubigera*, Kurz ... 183
,, pubinervis, Bl. ... 54
  var. Teysmannii ... 54
,, *pulchra*, Wall. ... 183
,, pumila, Linn. ... 124
,, *pumila*, Thunbg. ... 141
,, *pumila*, var. A, Thunbg. 124
,, punctata, Thunbg. ... 68
  var. falcata ... 69
,, *punctata*, Hb. Heyne ... 63
,, pungens, Reinw. ... 93
,, purpurascens, Bl. ... 75
,, *pyrifolia*, Burm. ...183, 141

Ficus *pyrrhocarpa*, Kurz ... 115
,, *pyrrhopoda*, Miq. ... 183
,, pyriformis, Hook. and Arn. 157
  var. Abelii ... 158
  var. subpyriformis ... 158
  var. ischnopoda ... 158
,, quercifolia, Roxb. ... 77
  var· humilis ... 78
,, *quercifolia*, Bl. ... 86
,, *racemosa*, Linn. ... 183
,, *racemosa*, Wall. ... 173
,, *racemifera*, Roxb. ... 169
,, *radiata*, Dcne. ... 119
,, *radicans*, Roxb. ... 86
,, *ramea*, Wall. ... 183
,, ramentacea, Roxb. ... 135, 17
  var. adhærens ... 136
,, *rapiformis*, Roxb. ... 119
,, *raridens*, Miq. ... 86
,, recurva, Bl. ...127, 131
  var. ribesoides ... 132
  var. urnigera ... 132
,, *reflexa*, Thunbg. ... 183
,, *Reinwardtii*, Lamk. and Otto 148
,, religiosa, Linn. ... 55, 62
,, *Remblas*, Miq. ... 3, 81
,, *renitens*, Miq. ... 89
,, *repens*, Ham. ... 76
,, *repens*, Herb. Mad. ... 77
,, *repens*, Willd. ... 76
,, *reticulata*, Thunbg. ... 183
,, *reticulosa*, Miq. ... 6
,, retusa, Linn. ... 50
  var. nitida ... 51
  var. *macrocarpa*, *Kurz* 183
,, *retusa*, Herb. Mad. ... 139
,, rhododendrifolia, Miq. ... 47
,, *rhynchophylla*, Wall. ... 183
,, ribes, Reinw. ... 110
,, *ribesoides*, Wall. ... 131
,, *rigescens*, Miq. ... 17, 135
,, Riedelii, Miq. ... 94
,, *rigida*, Ham. ... 63
,, *rigida*, Bl. ... 5
,, rigida, Miq. ... 35
,, rostrata, Lamk. ... 86, 154
,, *rotundifolia*, Roxb. ... 183
,, Rowelliana, King ... 38
,, Roxburghii, Wall. 168, 171, 177
,, *regia*, Miq. 168, 171
,, *Roxburghii*, Miq. ... 149
,, *rubescens*, Bl. ... 39
,, *rubicaulis*, Dcne. ... 90
,, *rubifolia*, Griff. ... 76
,, *rubra*, Lamk. ... 184
,, *rubra*, Roth. ... 179, 50
,, *rubra*, Vahl ... 184
,, rudis, Miq. ... 85
,, *rufescens*, Ham. ... 76
,, *rufescens*, Vahl ... 76

Ficus *rufipila*, Miq. ... 10, 11
,, Rumphii, Bl. ... 54, 62
,, *rupestris*, Bl. ... 184
,, *rupestris*, Ham. ... 20
,, rubra, Vahl ... 184
,, sæmocarpa, Miq. ... 115
,, *sagittata*, Vahl ... 184
,, *salicifolia*, Miq. ... 89
,, *sarmentosa*. Herb. Ham. 184
,, *saxatilis*, Bl. ... 86
,, *saxatilis*, Miq. ... 3
,, saxophila, Bl. ... 17
,, *scaberrima*, Bl. ... 81
,, *scabra*, Jacq. ... 116
,, *scabra*, Forst. ... 94
,, *scabrella*, Roxb. 184, 76, 92
,, scandens, Roxb. ... 129
,, Schefferiana, King ... 152
,, *sclerocoma*, Miq. ... 184
,, *sclerophylla*, Roxb. ... 6
,, *scleroptera*, Miq. ... 84
,, *scleroptera*, Griff. ... 168
,, Scortechinii, King ... 112
,, semi-cordata, Miq. ... 79
,, *septica*, Rumph. ... 119
,, *serpyllifolia*, Bl. ... 184
,, *serraria*, Miq. ... 85
,, *setifera*, Steud. ... 149
,, *setosa*, Bl. ... 149
,, *sideroxylifolia*, Griff. ... 139
,, *Sieboldi*, Miq. ... 141
,, Sikkimensis, Miq. ... 89
,, Silhetensis, Miq. ... 154
,, *simplicissima*, Lour. ... 184
,, Singalana, King ... 70
,, *sinuosa*, Miq. ... 77
,, Soronensis, King ... 161
,, *Spanogheana*, Miq. ... 131
,, *spathulata*, Miq. ... 139
,, *squamosa*, Roxb. ... 115
,, *stictocarpa*, Miq. ...119, 120
,, stipata, King ... 109
,, *stipulata*, Wall. ... 184
,, *stipulata*, Thunbg. ... 124
,, *stipulata*, Moon ... 125
,, *stipulosa*, Miq. ... 184, 64
,, stolonifera, King ... 104
,, *striata*, Roth. ... 43
,, stricta, Miq. ... 44
,, *strigosa*, Bl. ... 131
,, *stupenda*, Miq. ... 184
,, *subcordata*, Bl. ... 184
,, *subcuneata*, Miq. ... 184
,, *subdenticulata*, Miq ... 82
,, *suborbicularis*, Miq. ... 148
,, *sub-obliqua*, Miq. ... 5
,, *sub-opaca*, Bl. ... 169
,, *suborna*, Ham. MSS. ... 184
,, *subpanduræformis*, Miq. 76
,, *subpedunculata*, Miq. 184, 49, 50
Ficus *subpyriformis*, Miq. ... 157
,, sub-racemosa, Bl. ... 169
,, *sub-repanda*, Wall. 184, 20, 45, 68
,, *sub-rigida*, Miq. ... 135
,, *subulata*, Bl. ... 8
,, *sub-subulata*, Miq. ... 184
,, superba, Miq. ... 59
,, Sumatrana, Miq. ... 40
,, *Sundiaca*, Bl. ... 39
,, *superstitiosa*, Link. ... 184
,, Swinhoei, King ... 81
,, *symphytifolia*, Lamk. ... 184
,, sycomoroides, Miq. ... 172
,, *Tabing*, Miq. ... 10
,, *Tadjam*, Miq. ... 4, 9
,, Talboti, King ... 51
,, *Tampang*, Miq. ... 184
,, *tenax*, Bl. ... 185
,, *tengerensis*, Miq. ... 114
,, *tenuiramis*, Kunth et
Bouché 88
,, *terminalis*, Roth. ... 185
,, *teminalioides*, Griff. ... 60
,, *Ternatana*, Miq. ... 185
,, *Tetangis*, Miq. ... 10
,, *Teysmanniana*, Miq. ... 131
,, *Timorensis*, Dcne. ... 185
,, Timorensis, Miq. ... 63
,, Tjakela, Burm. ...57, 60, 62
,, *Tjiela*, Zoll. ... 60
,, *Tjiela*, Rheede ... 19
,, *Timorensis*, Miq. ... 63
,, *Thomsoni*, Miq. ... 37
,, *Thunbergii*, Maxim. ... 133, 134
,, Thwaitesii, Miq. ... 125
,, tomentosa, Roxb. ... 22
,, *tomentosa*, *Herb. Mad.* ... 20
,, *tondana*, Miq. ... 4
,, *tonsa*, Miq. ... 185
,, *torulosa*, Wall. ... 159
,, *toxica*, Thunb. ... 146
,, toxicaria, Linn. ... 146
,, *trachycarpa*, Miq. ... 87
,, *trachycoma*, Miq. ... 67
,, Travancorica, King ... 28
,, trematocarpa, Miq. ... 6, 7
,, Treubii, King ... 105
,, tricolor, Miq. ... 142
var. leucoma ... 143
,, *trichocarpa*, Bl. ... 185
,, *trilepis*, Miq. ... 162
,, *triloba*, Ham. ... 149
,, Trimeni, King ... 46, 60
,, *triplinervis*, Wall. ... 129
,, truncata, Miq. ... 41
,, *truncata*, Vahl ... 76
,, *Tsiela*, Rheede ... 40
,, *Tsjela*, Ham. ... 185
,, Tsiela, Roxb. ... 59
,, tuberculata, Roxb. ... 6
,, *tuberculata*, Wall. ... 115
Ficus *ulmifolia*, Lamk. ... 185. 84
,, umbonata, Reinw. ... 91
,, *umbonata*, Wall. ... 154
,, *undulata*, Ham. ... 185
,, *uniglandulasa*, Wall. ... 86
,, *unigibba*, Miq. ... 5
,, *urnigera*, Miq. ... 132
,, urophylla, Wall. ... 11. 87
,, *urticæfolia*, Roxb. ... 185
,, vaccinioides, Hems. and
King ... 126
,, *vaguns*, Roxb. ...128, 166
,, *vagans*, Wall. ... 135
,, *valida*, Bl. ... 25
,, *variabilis*, Miq. ... 89
,, variegata, Bl. ...169, 172
var. chlorocarpa ... 170
,, *Varinga*, Ham. ... 30
,, variolosa, Lindl. ... 153
,, vasculosa, Wall. ... 65
,, *venosa*, Poir. ... 61
,, *venosa*, Willd. ...119, 120
,, *venosa*, Ait. 57, 60, 61
,, *venosa*, Ham. ... 61
,, *vestita*, Wall. ... 185
,, *villipes*, Miq. ... 131
,, villosa, Bl. ... 137
,, *virgata*, Reinw. ... 8
,, *virgata*, Roxb. ... 148
,, *virgata*, Miq. ... 185
,, *volkameriæfolia*, Wall. ... 118
,, *volubile*, Dalz. and Gibs. ... 185
,, Vriesiana, Miq. ... 100
,, *Wassa*, Roxb. ... 185
,, *Wightiana*, Wall. 185, 57, 63
,, *Wightiana*, Benth. ... 49
,, Wrightii, Benth. ... 133
,, xylophylla, Wall. ... 29
,, *Zollingeriana*, Miq. ... 40, 185
Gudha-ke-Bhur 22
Itabu 141
Katou Alou, Rheede 18, 19, 40
Moessoe 173
Macrophthalmia elastica, Gasp. 45
NEOMORPHE 2
Pakur 61
PALÆOMORPHE 1, 3
Peralu, Rheede 18, 19
Plagiostigma stipulata, Zucc. ... 124
,, *pumila*, Zucc. ... 124
Pogonotrophe alnifolia, Miq. ... 130
,, *Assamica*, Miq. ... 128
,, *aurantiaca*, Miq. 143
,, *Bornensis*, Miq. ... 130
,, *Ceylanica*, Miq. ... 128
,, *dasyphylla*, Miq. ... 128
,, *emodi*, Miq. ... 129
,, *flavidula*, Miq. ... 148
,, *foveolata*, Miq. ... 133, 134
,, *glandulifera*, Miq. 143
,, *Javana*, Miq. ... 130

INDEX.

Pogonotrophe lævis, Miq. ... 128
,, *macrocarpa*, Miq. 166
,, *phæopoda*, Miq. ... 130
,, *piperifolia*, Miq. ... 130
,, *pubigera*, Miq. ... 133
,, *pyrrhopoda*, Miq. 183
,, *reticulata*, Miq. ... 133
,, *ribesoides*, Miq. ... 131
,, *rigida*, Miq. ...135, 136
,, *Sumatrana*, Miq. 143
,, *vagans*, Miq. ...128, 166
,, *verrucosa*, Miq. ... 133
,, *Wightiana*, Miq.... 185
Prismatosyce Minahassæ, Teysm. 108
Sycocarpus congesta, Miq. ... 180
SYCIDIUM 2, 73
Sycomorus capensis, Miq. ... 169
,, *gummiflua*, Miq. ... 169
SYNŒCIA 2, 67
,, *diversifolia*, Miq. ... 51, 139
,, *Guillielmi* I, De Vriese 67
,, *falcata*, Miq. ... 68
,, *grandifolia*, Kurz ... 140
,, *serpens*, Miq. ... 68
,, *Sumatrana*, Miq. ... 69
Tenorea heterophylla, Gasp. ... 124
Tsjakela, Rheede 57, 61
UROSTIGMA 2, 13
,, *acamptophyllum*, Miq. 40
,, *accedens*, Miq. ... 59
,, *ægeirophyllum*, Miq. 62, 63
,, *affine*, Miq. ... 50, 55
,, *altissimum*, Miq. ... 30
,, *annulatum*, Miq. ... 25
,, *apiculatum*, Miq. ... 179
,, *apiocarpum*, Miq. ... 70
,, *Arnottianum*, Miq. 56
,, *balicum*, Miq. ... 179
,, *Bengalense*, Gasp. ... 18
,, *Benjamineum*, Miq. 43
,, *bicorne*, Miq. ... 21
,, *Binnendykii*, Miq. 41
,, *biverrucellum*, Miq. 25, 26
,, *bracteatum*, Miq. ... 23
,, *calophyllum*, Miq. ... 52
,, *canaliculatum*, Miq. 49
,, *caulobotryum*, Miq.... 57
,, *caulocarpum*, Miq. ... 63, 106
,, *Ceylonense*, Miq. ... 57, 60
,, *chrysophthalmum*, Miq. 180
Urostigma chrysothrix, Miq. ... 21
,, *circumcissum*, Miq.... 45
,, *clusioide*, Miq. ... 42
,, *concinnum*, Miq. ... 50
,, *conocarpum*, Miq. ... 25
,, *connivens*, Miq. ... 22
,, *consociatum*, Miq. ... 33
,, *cordifolium*, Miq. ... 54
,, *Courtallense*, Miq. ... 56
,, *crassirameum*, Miq. 36
,, *cycloneurum*, Miq. ... 31
,, *dasycarpum*, Miq. ... 20
,, *depressum*, Miq. ... 24, 25
,, *Diepenhorstii*, Miq. 181
,, *elasticum*, Miq. ... 45
,, *euneuron*, Miq. ... 53
,, *excelsum*, Miq. ... 181
,, *flavescens*, Miq. ... 25
,, *giganteum*, Miq. ... 184
,, *glabellum*, Miq. ... 49
,, *glaberrimum*, Miq.... 37
,, *globosum*, Miq. ... 27
,, *hæmatocarpum*, Miq. 43
,, *Hassellii*, Miq. ... 54
,, *infectorum*, Miq. ... 60
,, *involucratum*, Miq. 34
,, *Javanicum*, Miq. ... 180
,, *Karet*, Miq. ... 45
,, *lacciferum*, Miq. ... 30
,, *Lambertianum*, Miq. 63
,, *leucocarpum*, Miq. 60, 62, 174
,, *lucescens*. Miq. ... 60
,, *Manok*, Miq. ... 27, 38
,, *microcarpum*, Miq.... 50
,, *modestum*, Miq. ... 53
var. *longifolium*, Miq. 53
,, *monadenum*, Miq. ... 40
,, *Moritzianum*, Miq.... 49
,, *Mysorense*, Miq. ... 19
,, *neglectum*, Miq. ... 43
,, *nervosum*, Miq. ... 53
,, *nesophilum*, Miq. ... 50
,, *nitidum*, Miq. ... 50
,, *nudum*, Miq. ... 43, 47
,, *obtusifolium*, Miq. ... 41
,, *obversum*, Miq. ... 22
,, *odoratum*, Miq. ... 45
,, *oligoneurum*, Miq. ... 140
,, *onustum*, Miq. ... 27
,, *ovoideum*, Miq. ... 50
Urostigma parvifolium, Miq. ... 49
,, *peracutum*, Miq. ... 24, 25
,, *perseæfolium*, Miq. 63
,, *pilosum*, Miq. ... 21
,, *pisiferum*, Miq. ... 50
,, *pisocarpum*, Miq ... 48
,, *procerum*, Miq. ... 35
,, *pruniforme*, Miq. ... 24
,, *pseudo-Benjamineum*, Miq. 59
,, *pseudo-rubrum*, Miq. 39
,, *pseudo-tjiela*, Miq. 59
,, *pyrifolium*, Miq. ... 183
,, *religiosum*, Gasp. ... 55
,, *retusum*, Miq. ... 50
,, *rhododendrifolium*, Miq. 47
,, *rigidum*, Miq. ... 35
,, *rubescens*, Miq. ... 39
,, *Rumphii*, Miq. ... 54
,, *stipulosum*, Miq. ... 184, 64
,, *strictum*, Miq. ... 44
,, *subcordatum*, Miq. ... 184
,, *sub-cuspidatum*, Miq. 21
,, *Sumatranum*, Miq. ... 40
,, *Sundiacum*, Miq. ... 39
,, *superbum*, Miq. ... 59
,, *Timorense*, Miq. ... 60, 63
,, *Tjakela*, Miq. ... 57
,, *Tjiela*, Miq. ... 39, 46
var. *sundiaca*. Miq. 30
,, *tomentosum*, Miq. ... 22
,, *trichocarpum*, Miq. 185
,, *truncatum*, Miq. ... 41
,, *validum*, Miq. ... 25
,, virgatum, Miq. ... 185
,, *Wightianum*, Miq.... 57
var. *majus*, Thw. 57
,, *Wightianum*, Thw. 63
,, *xylophyllum*, Miq. 29
,, *Zollingerianum*, Miq. 186, 40
Valli teregam 76
Vuta 18
Varinga latifolia, Rumph. 39, 40, 60
,, *parvifolia*, Rumph. ... 43
,, *repens*, Rumph. ... 19
Visiania elastica, Gasp. 45
Waringin 44



FICUS ROXBURGHII, WALL.

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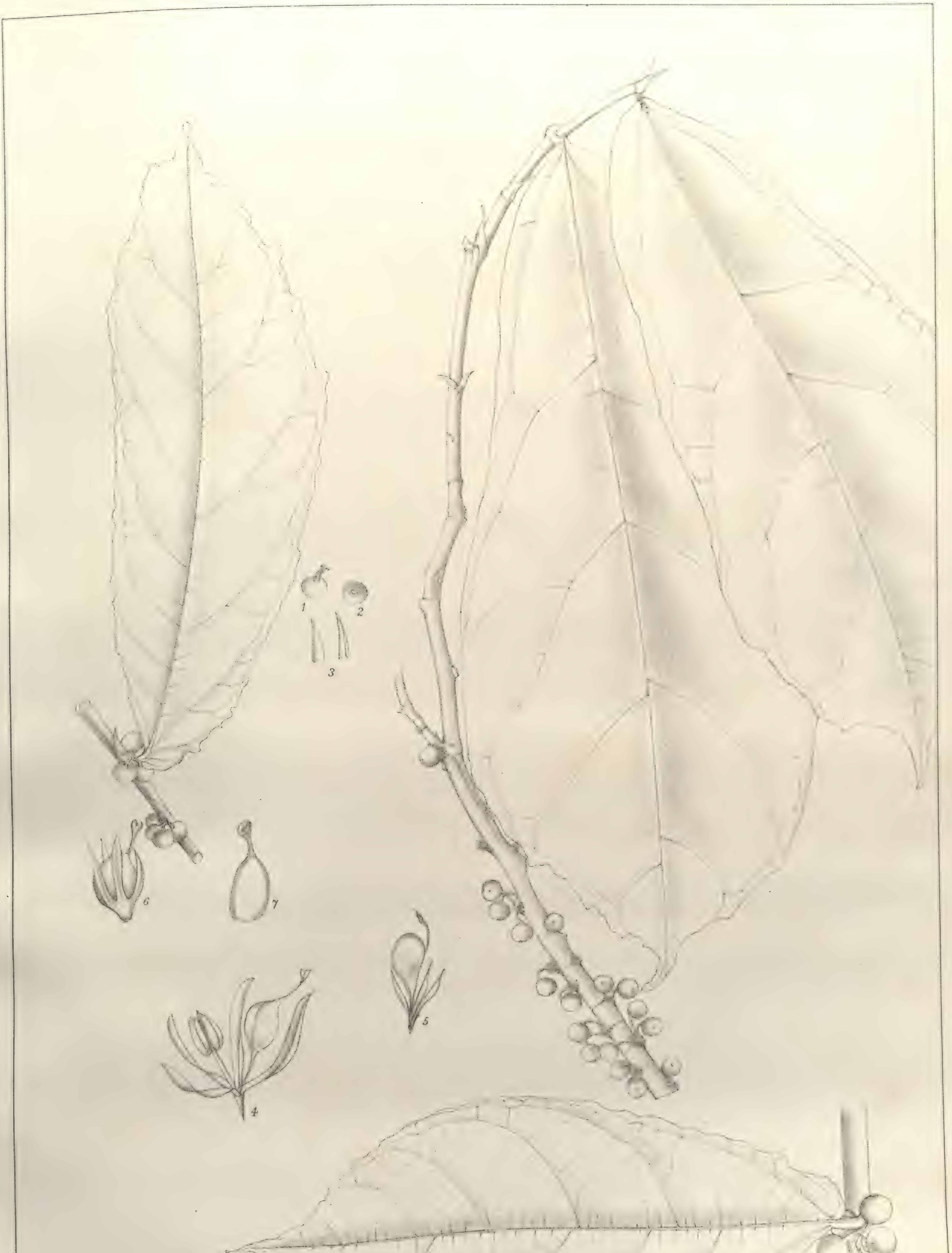

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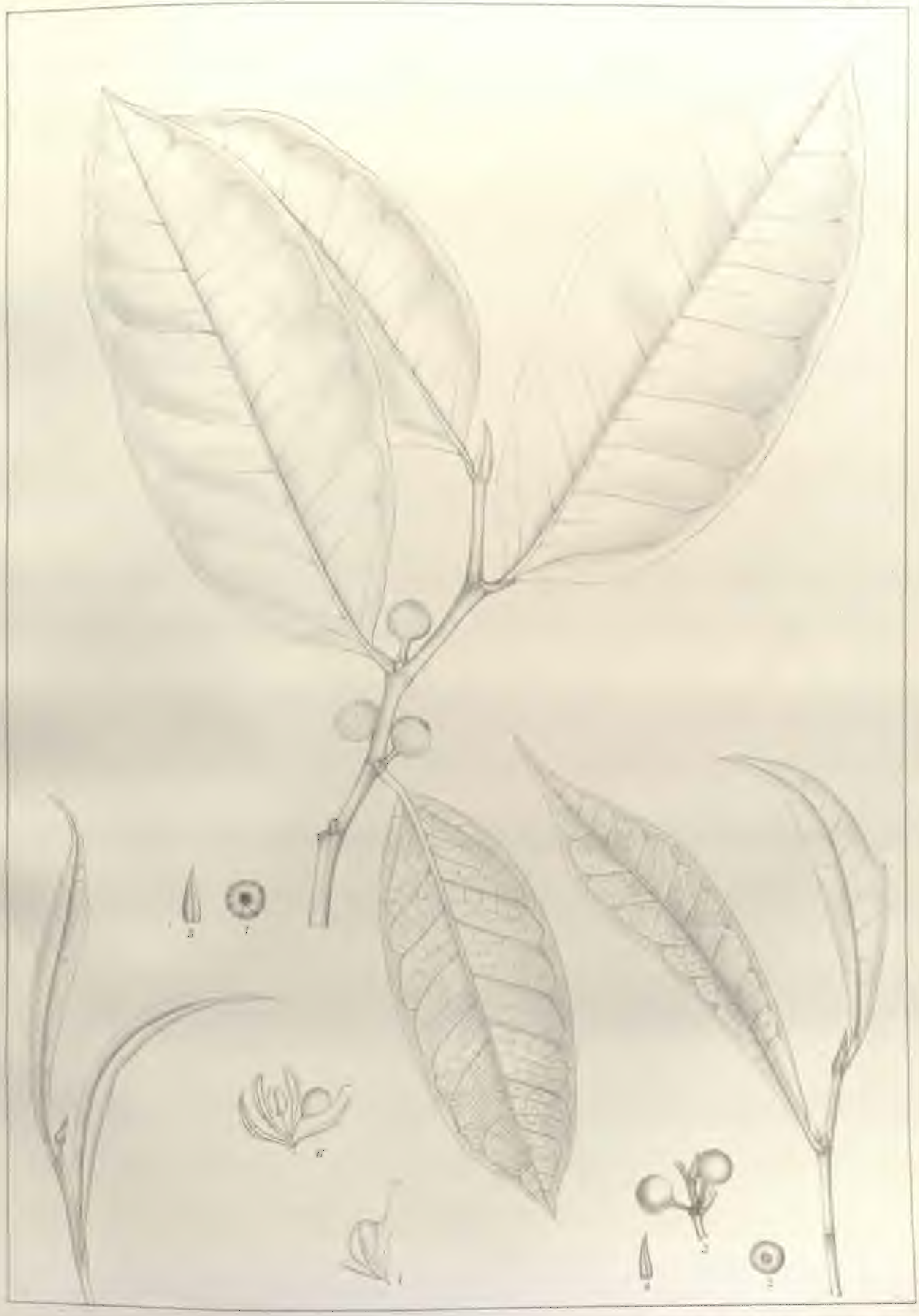
FICUS. PISIFERA, Wall.



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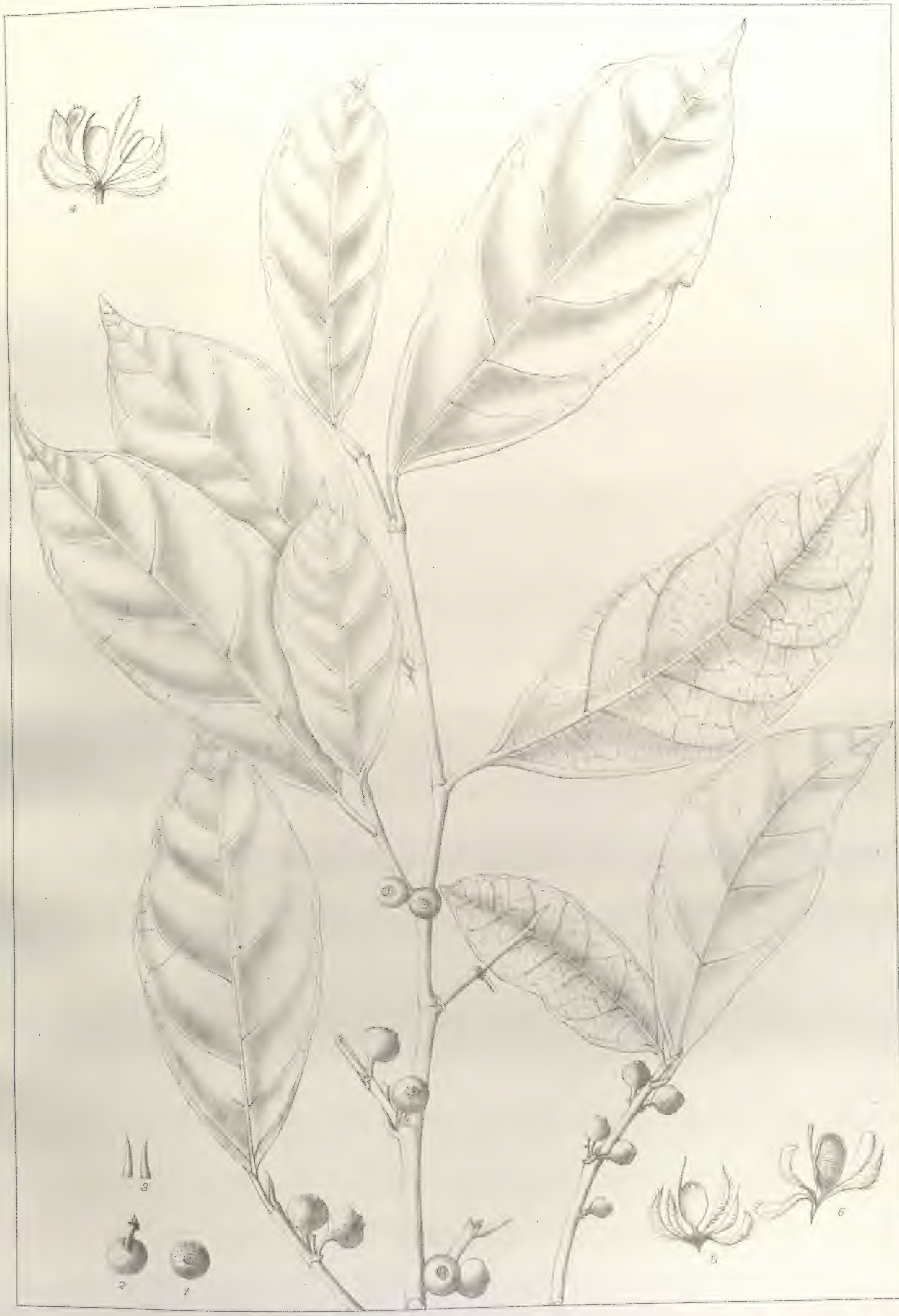
FICUS GIBBOSA, Blume



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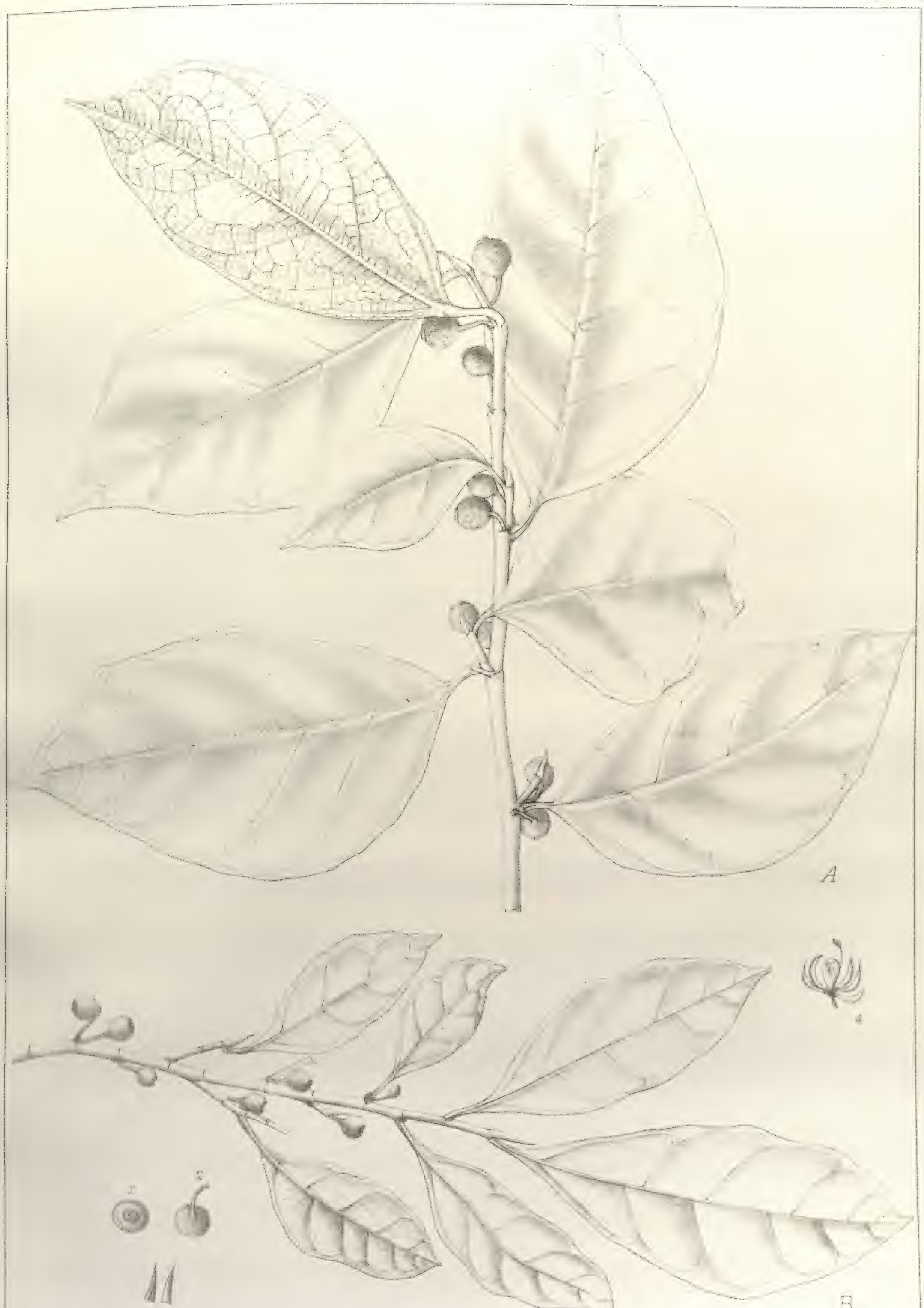

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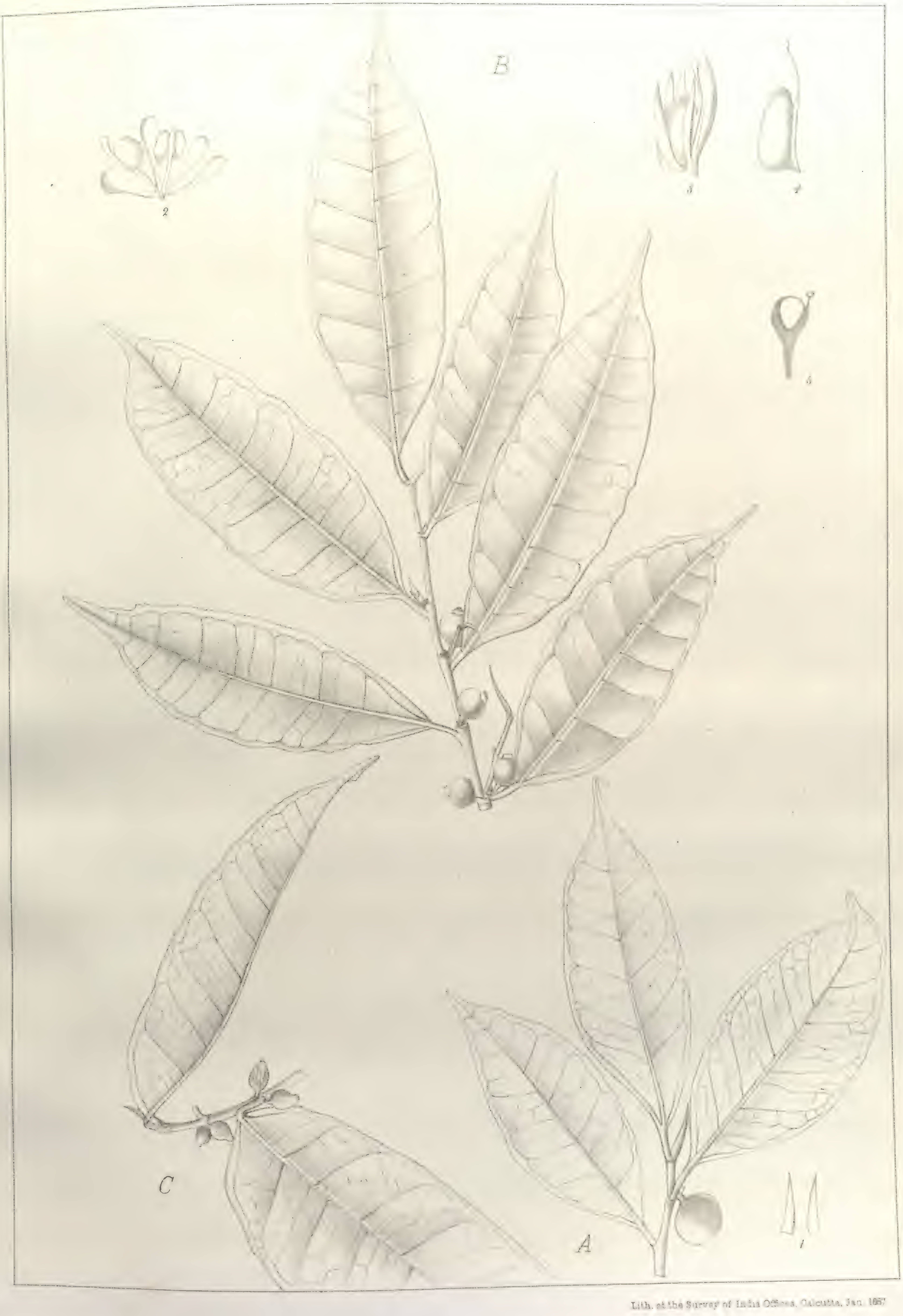

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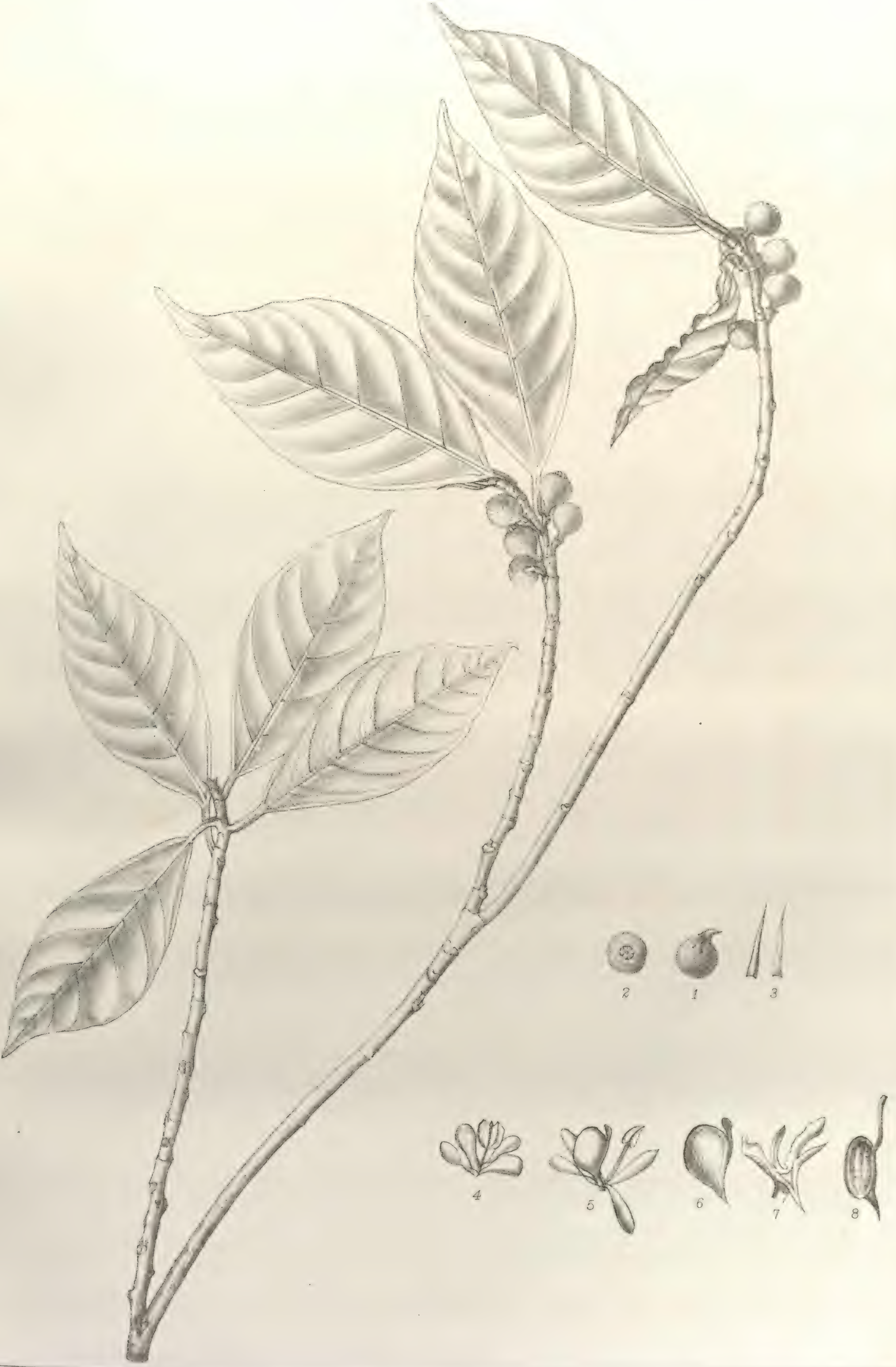
FICUS DECAISNEANA, Miq.

PLATE 4.



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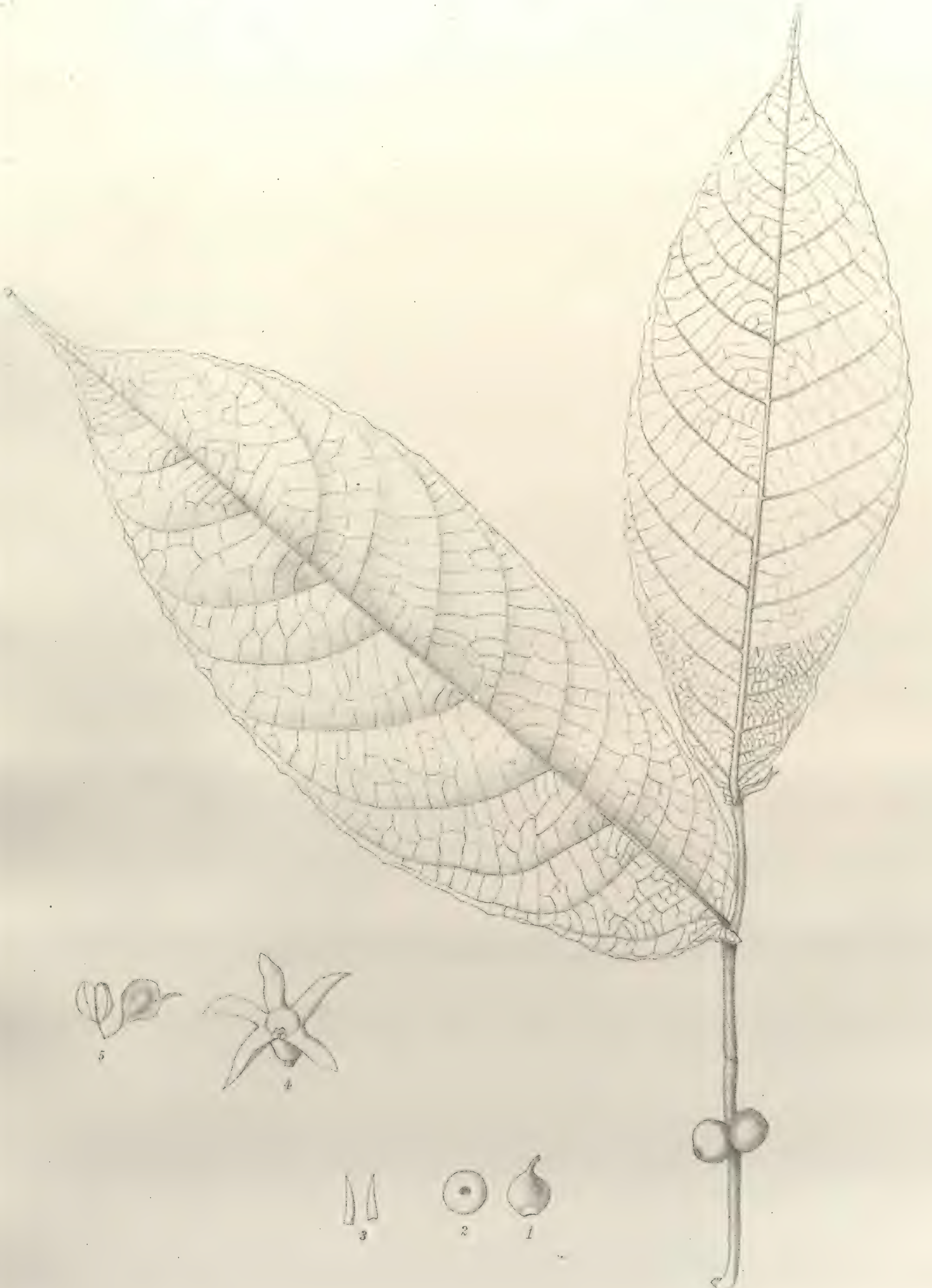
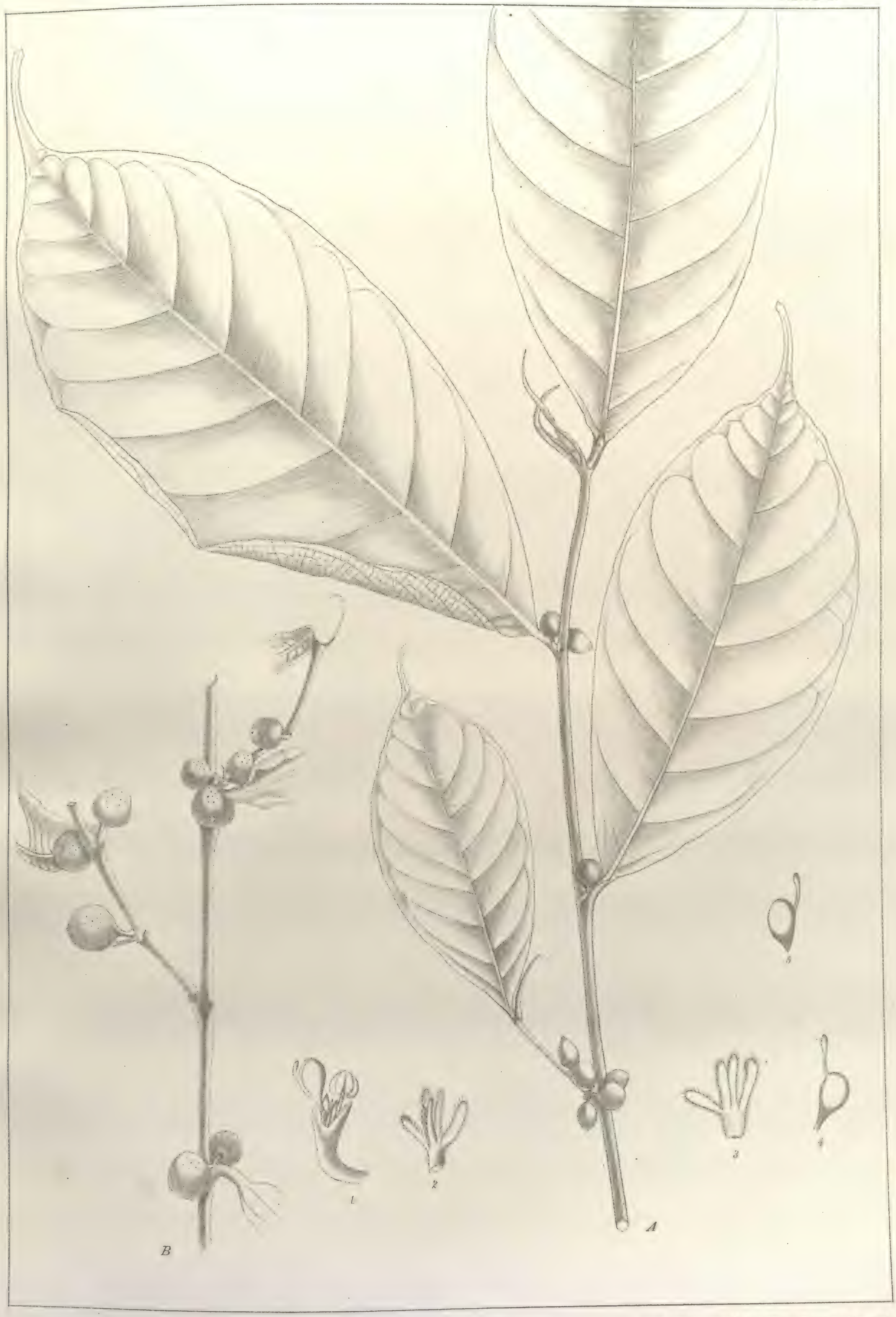
FICUS ADENOSPERMA, Miq



Lith. at the Survey of India Offices, Calcutta, Nov. 1886.

FICUS AURITA, Reinw.



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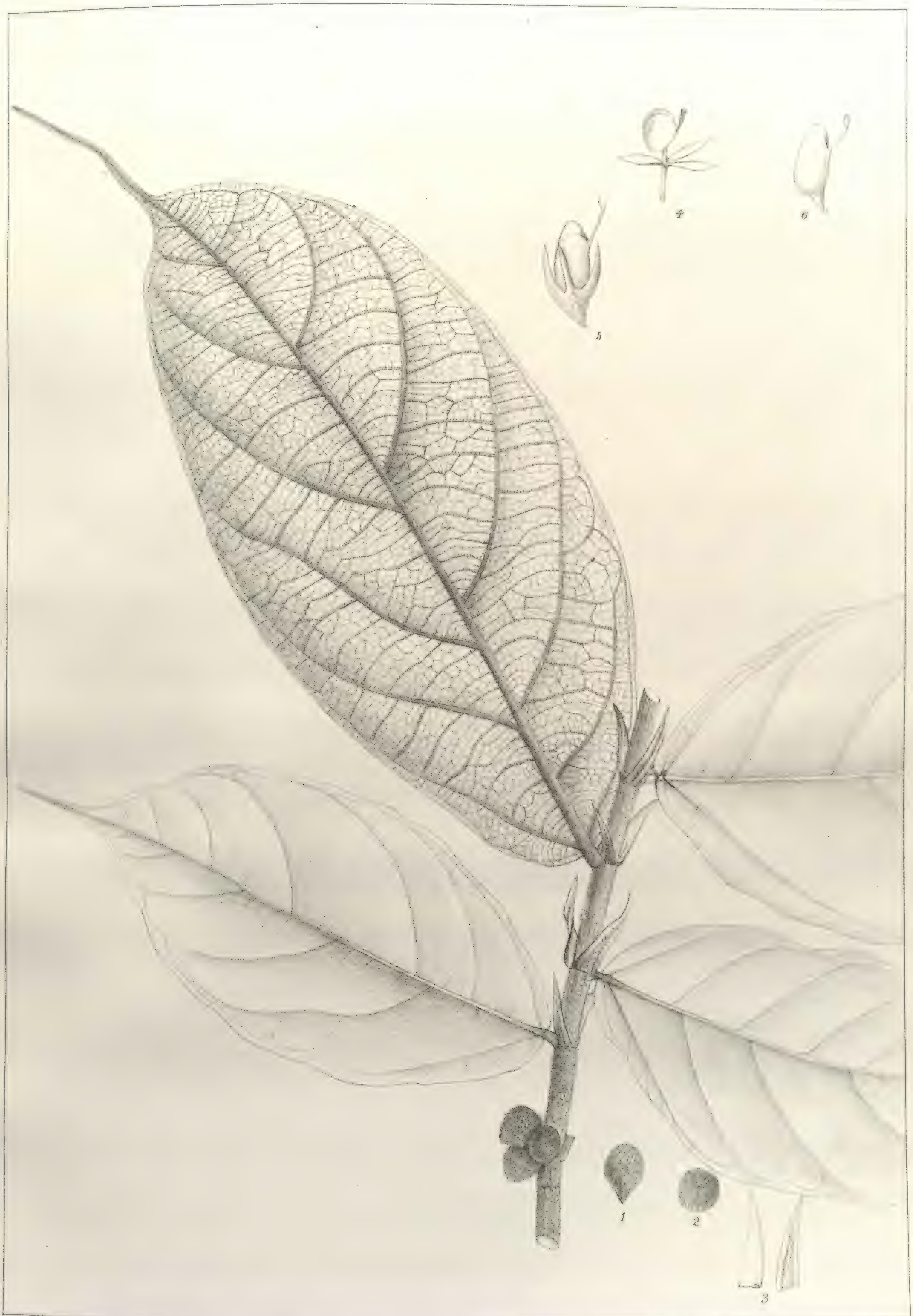
FICUS SUBULATA, Blume.



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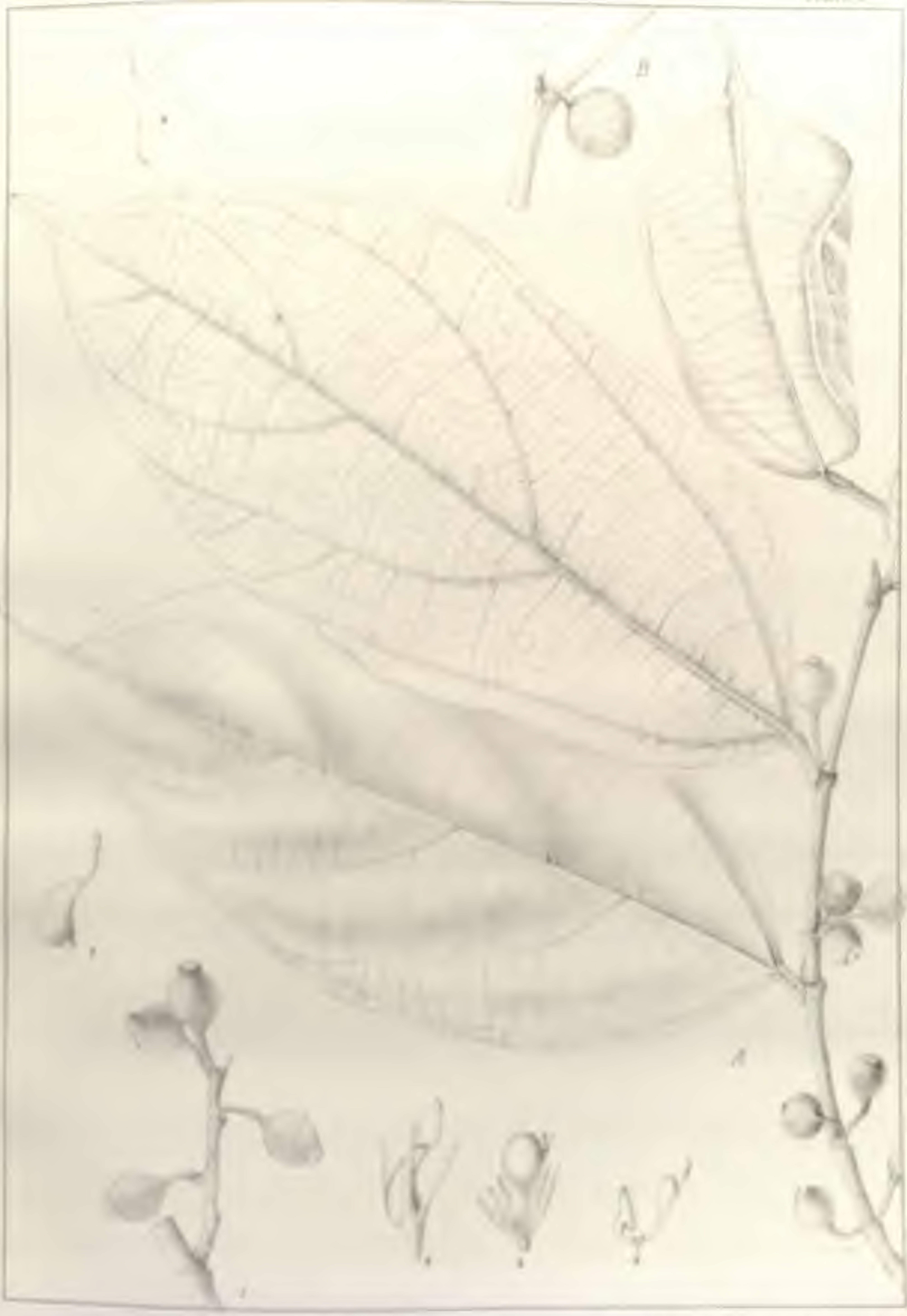
FICUS LASIOCARPA, Miq.



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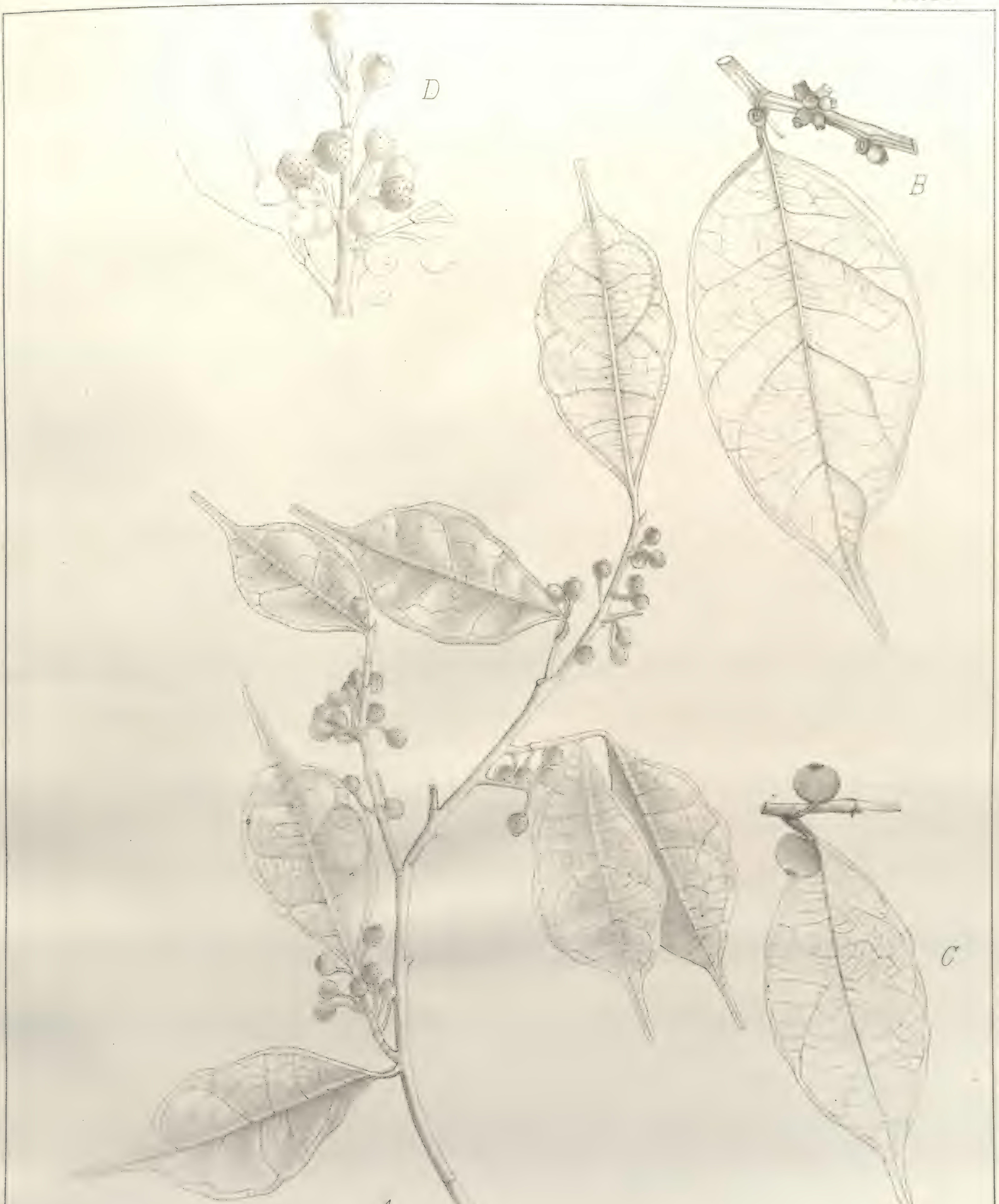
FICUS PARIETALIS Bl.

PLATE 8



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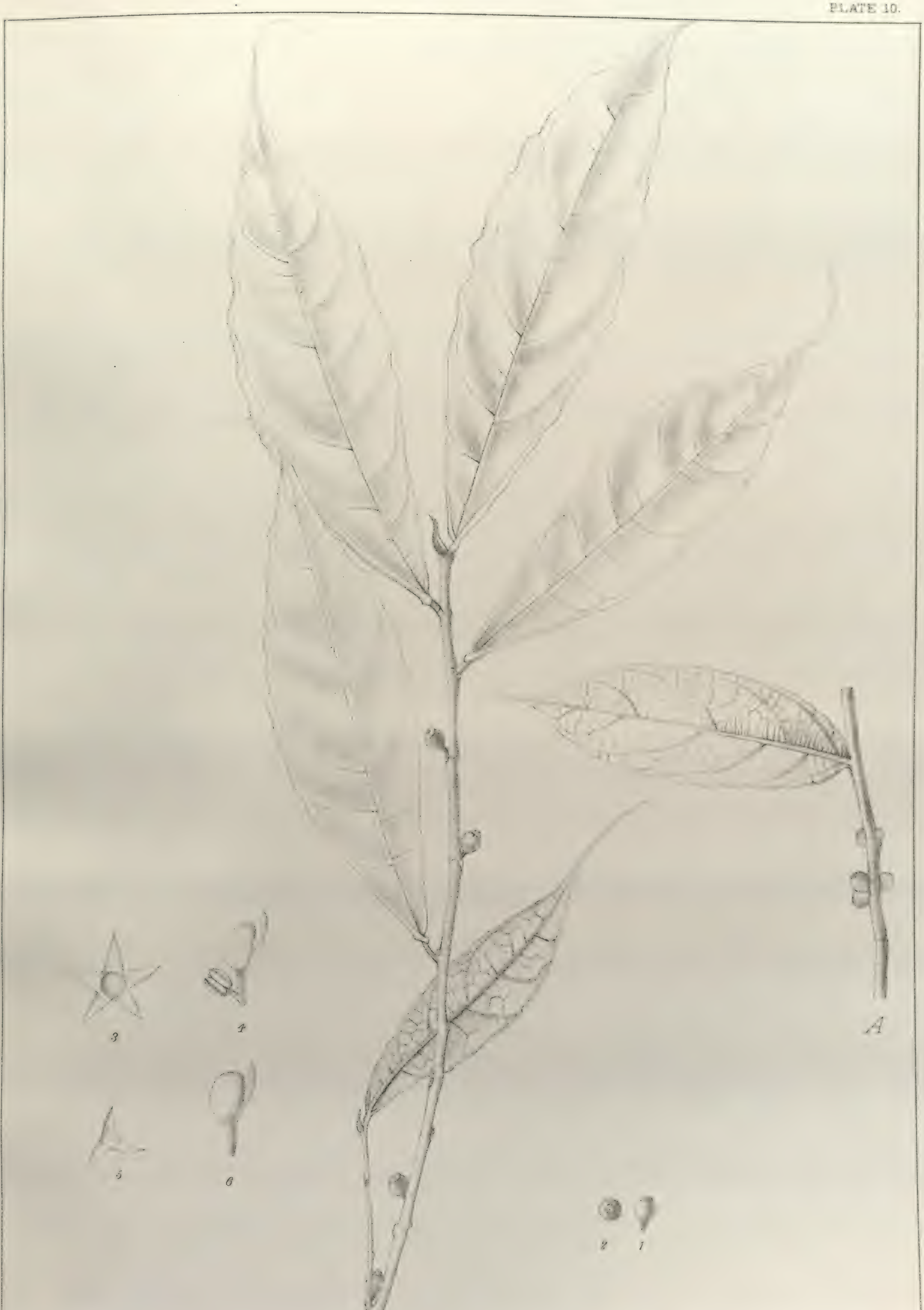
FICUS UROPHYLLA, Wall.



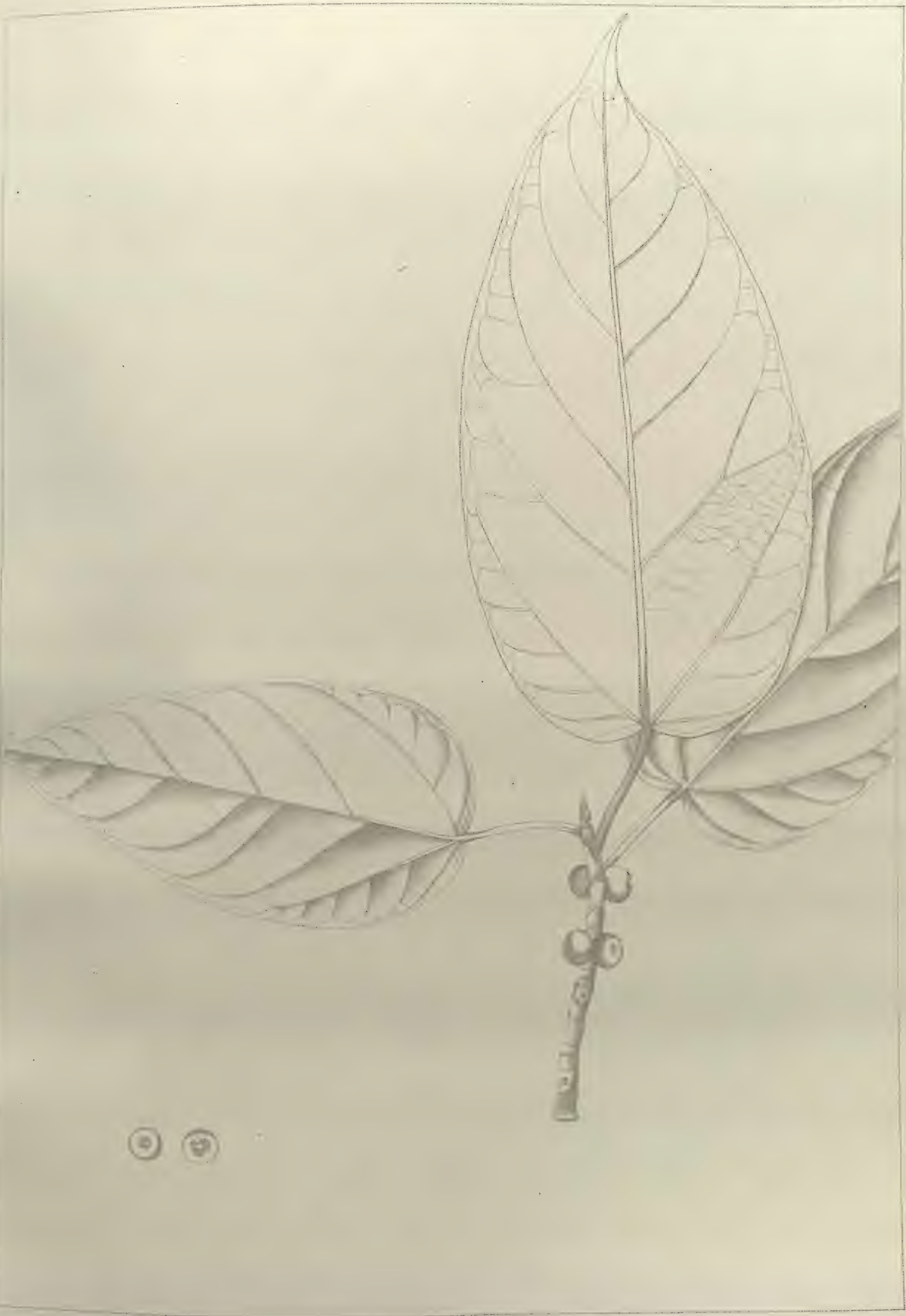
Lith. at the Survey of India Offices, Calcutta. Dec. 1886.

FICUS CELEBICA, Blume.

G.C Das del. Bot. Garden Calcutta.

Lith. by S. Banerji Govt. School of Art Calcutta.
W. Newman & Co. Ld. Imp.

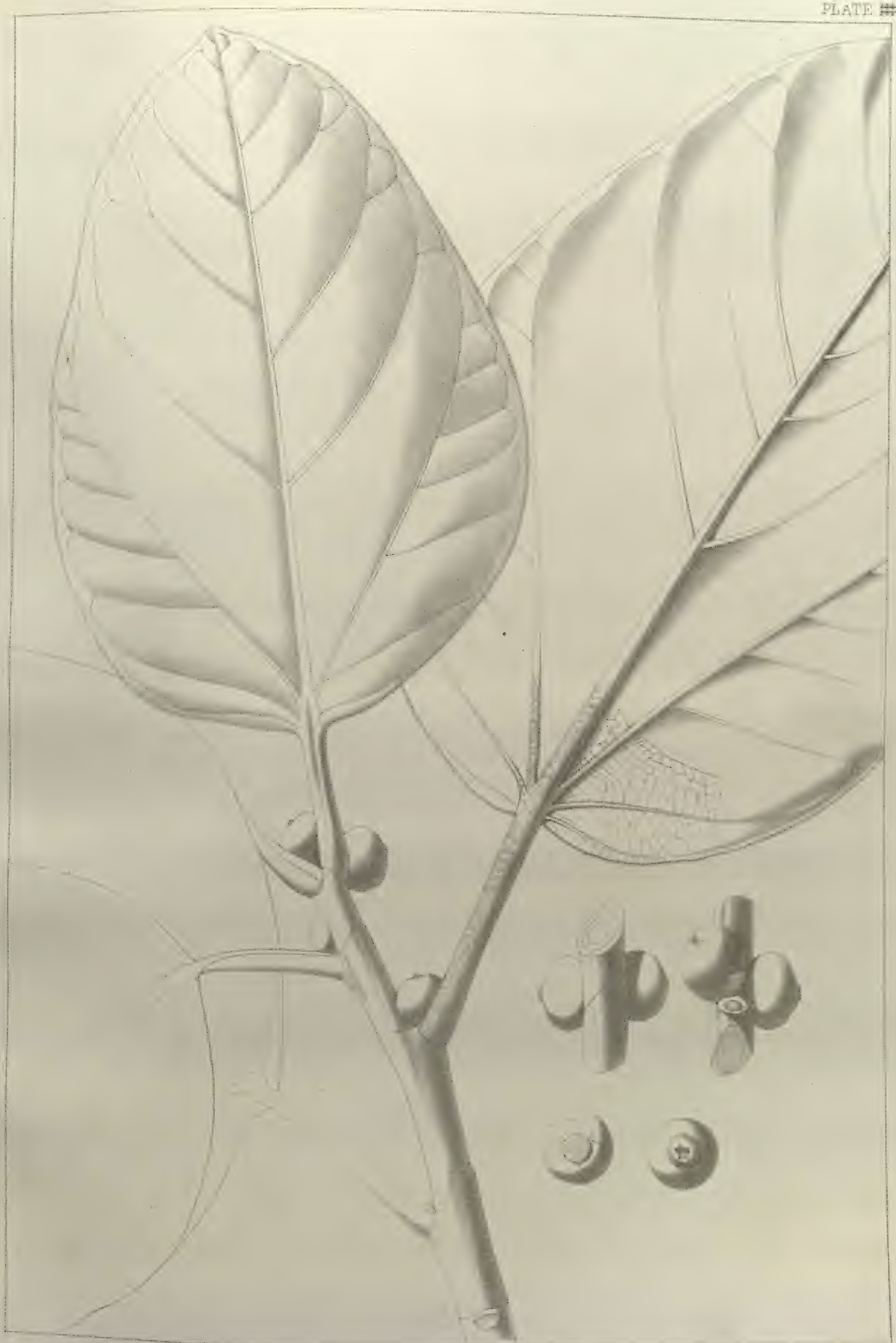
FICUS DALHOUSIAE, Miq.



[illegible] del. [illegible] Garden Calcutta.

Lith. by D. Mengy, Govt: School of Art, Calcutta.

FICUS SAXOPHILA, Blume.



[illegible]

Lith: by H. D Paul Govt: School of Art. Calcutta.

FICUS BENGALENSIS, Linn.

PLATE 11

G. C. Das del. Bot. Garden Calcutta.

Lith. by D. Neogy Govt School of Art Calcutta.
W. Newman & Co. Ld. Imp.

FICUS MYSORENSIS, ~~Roth.~~ Heyne.

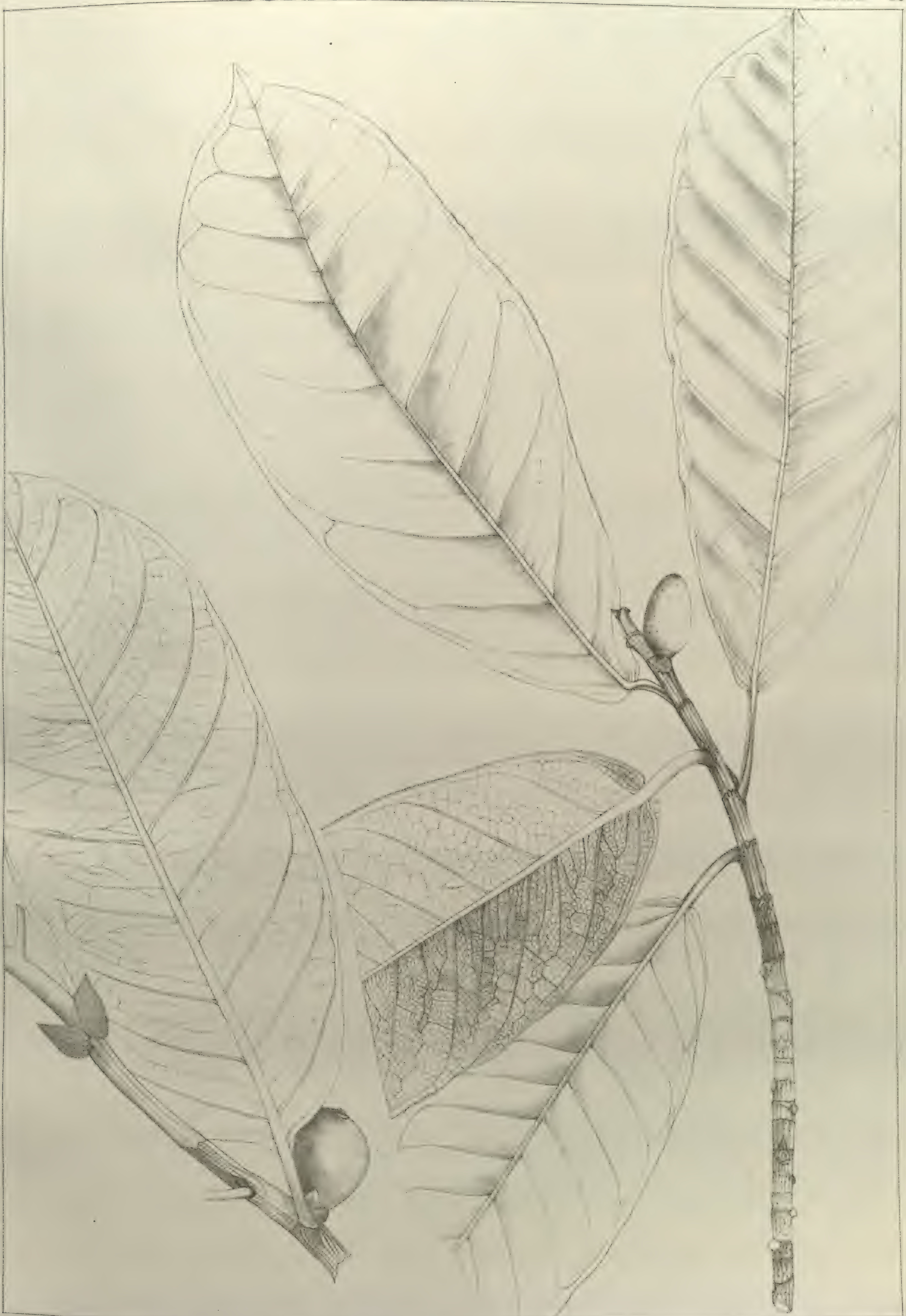
PLATE ~~VIII~~ 15

[illegible]

Lith by S. Banerji Govt. School of Art Calcutta

FICUS SUBREPANDA, Wall.

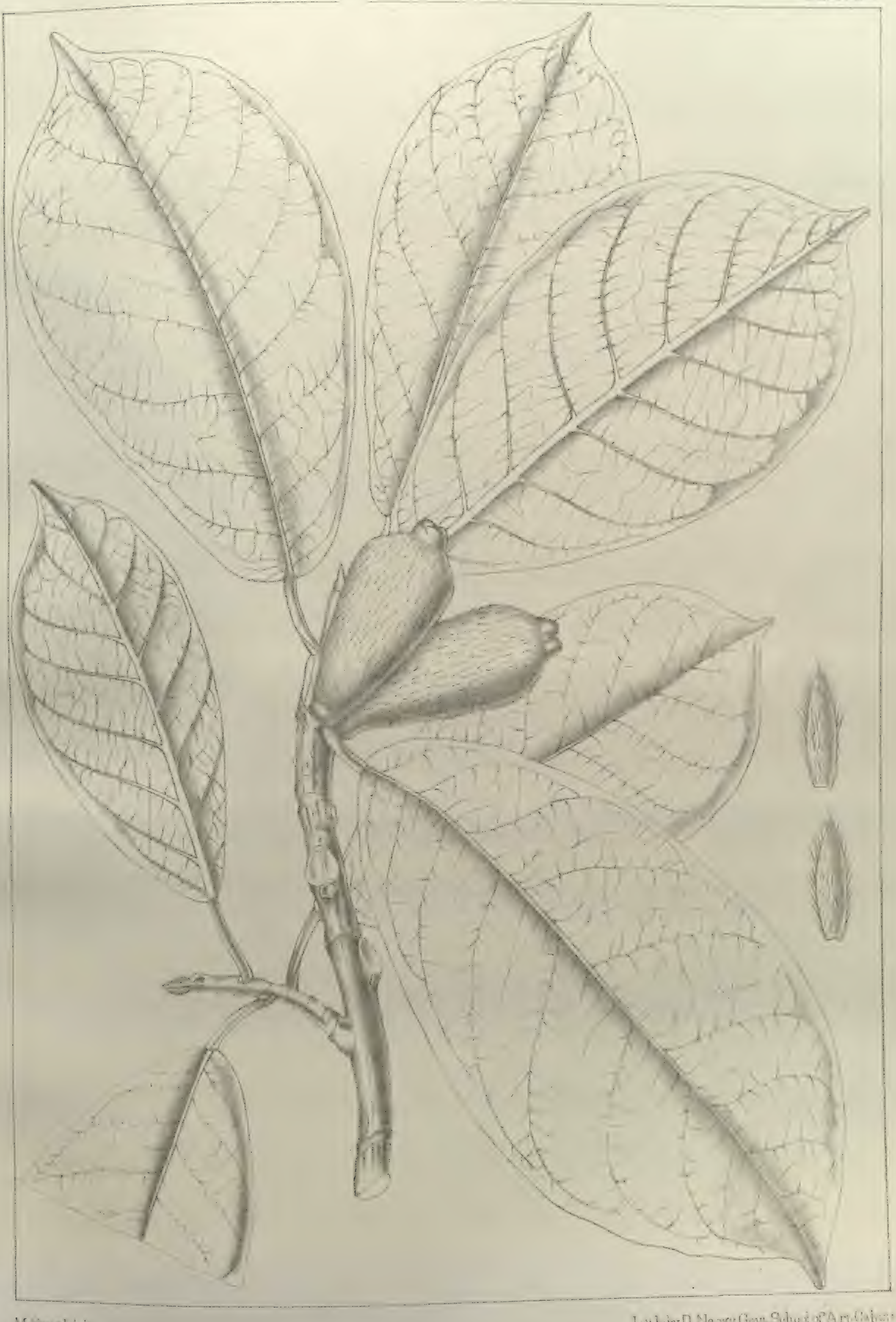
= FICUS MYSORENSIS. Roth var. subrepanda.



G. C. Das del. Bot. Garden Calcutta.

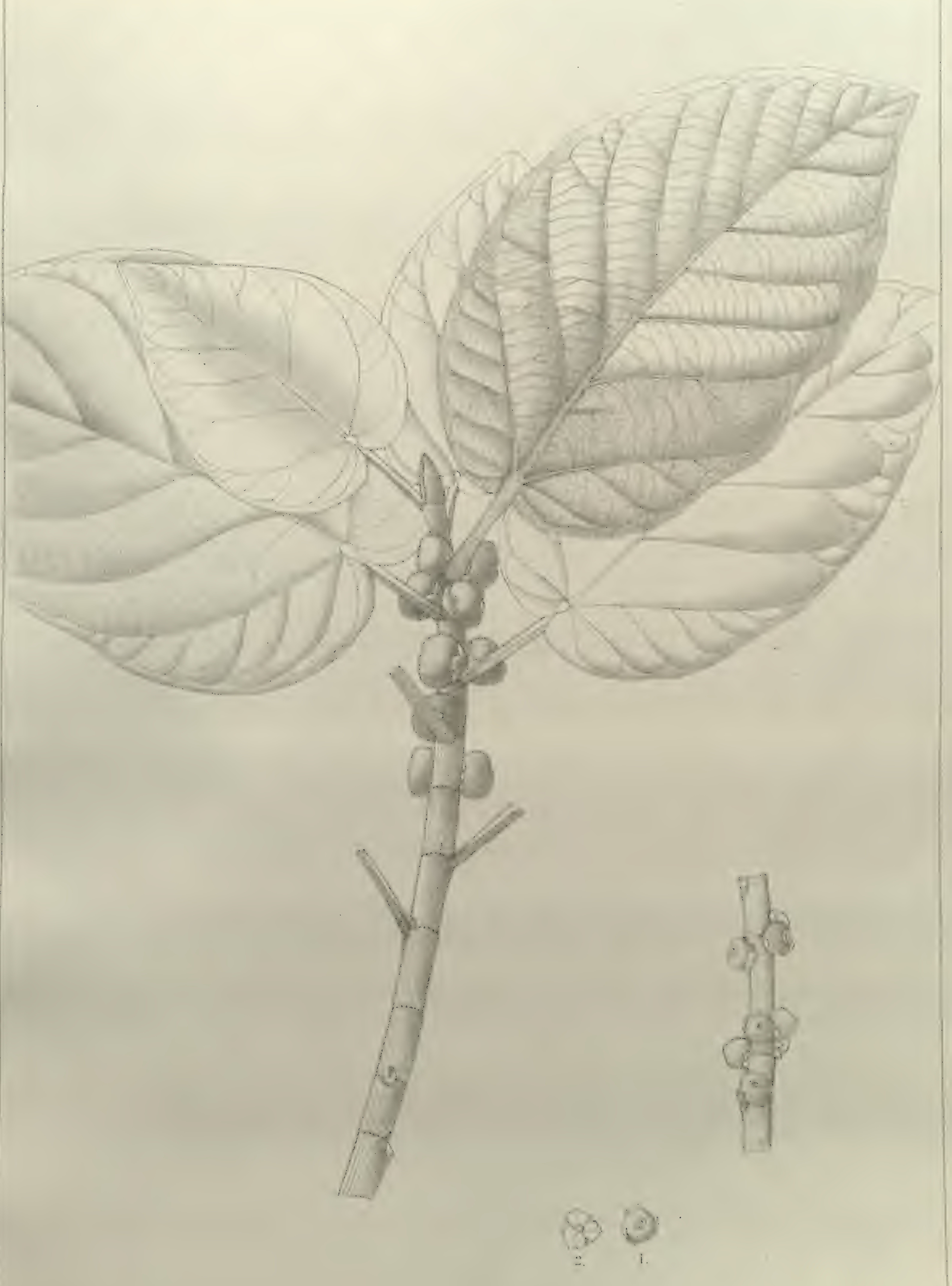
Lith: by H. L. Pal Govt. School of Art Calcutta.

FICUS PILOSA, ~~[illegible]~~ Reinw.



M. Smith del.

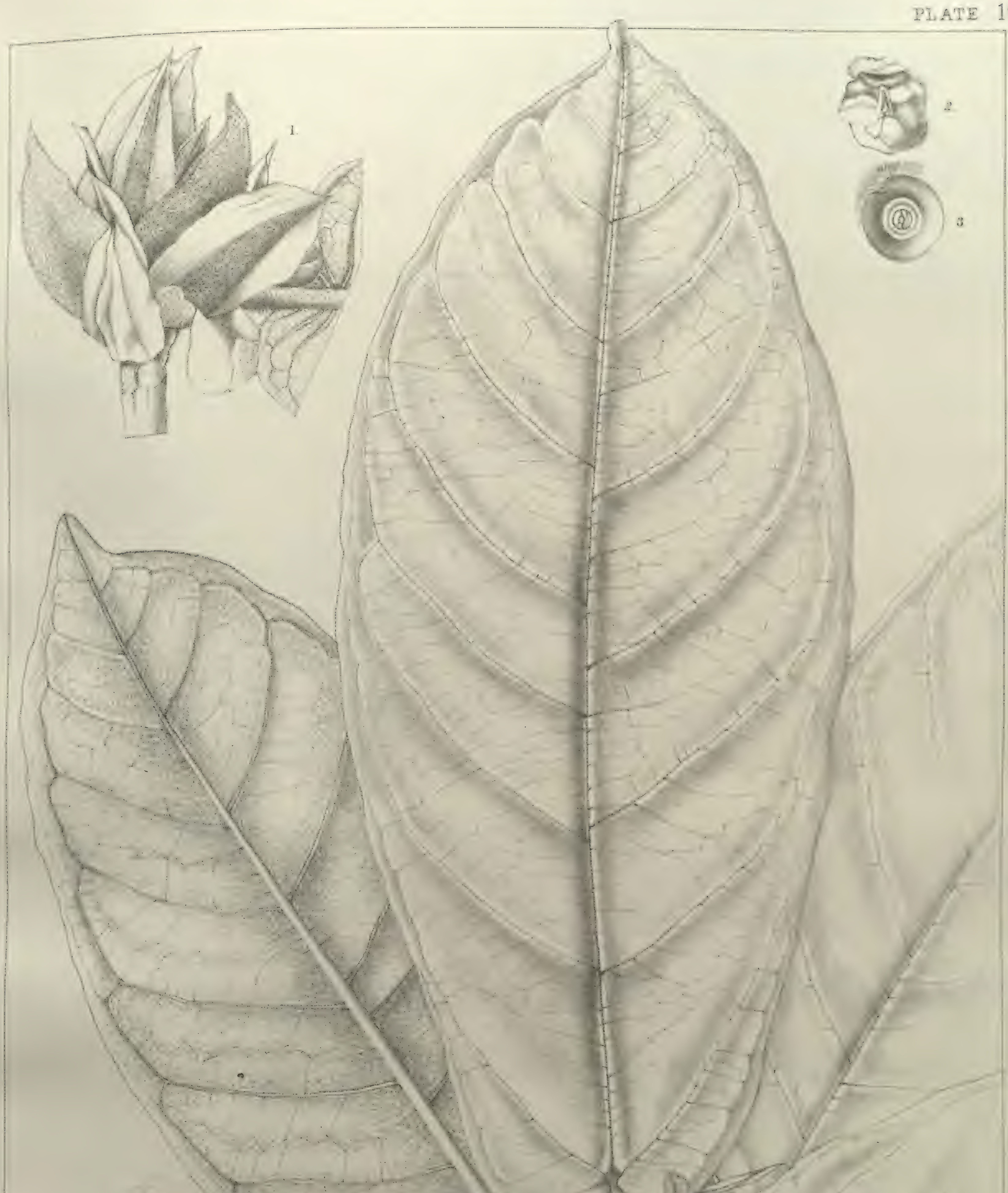
Lith by D. Nengy Govt. School of Art Calcutta.



G. C. Das del. Bot. Garden Calcutta.

Lith: by H. C. Dutt, Govt. School of Art Calcutta
W. Newman & Co. Ld. Imp.

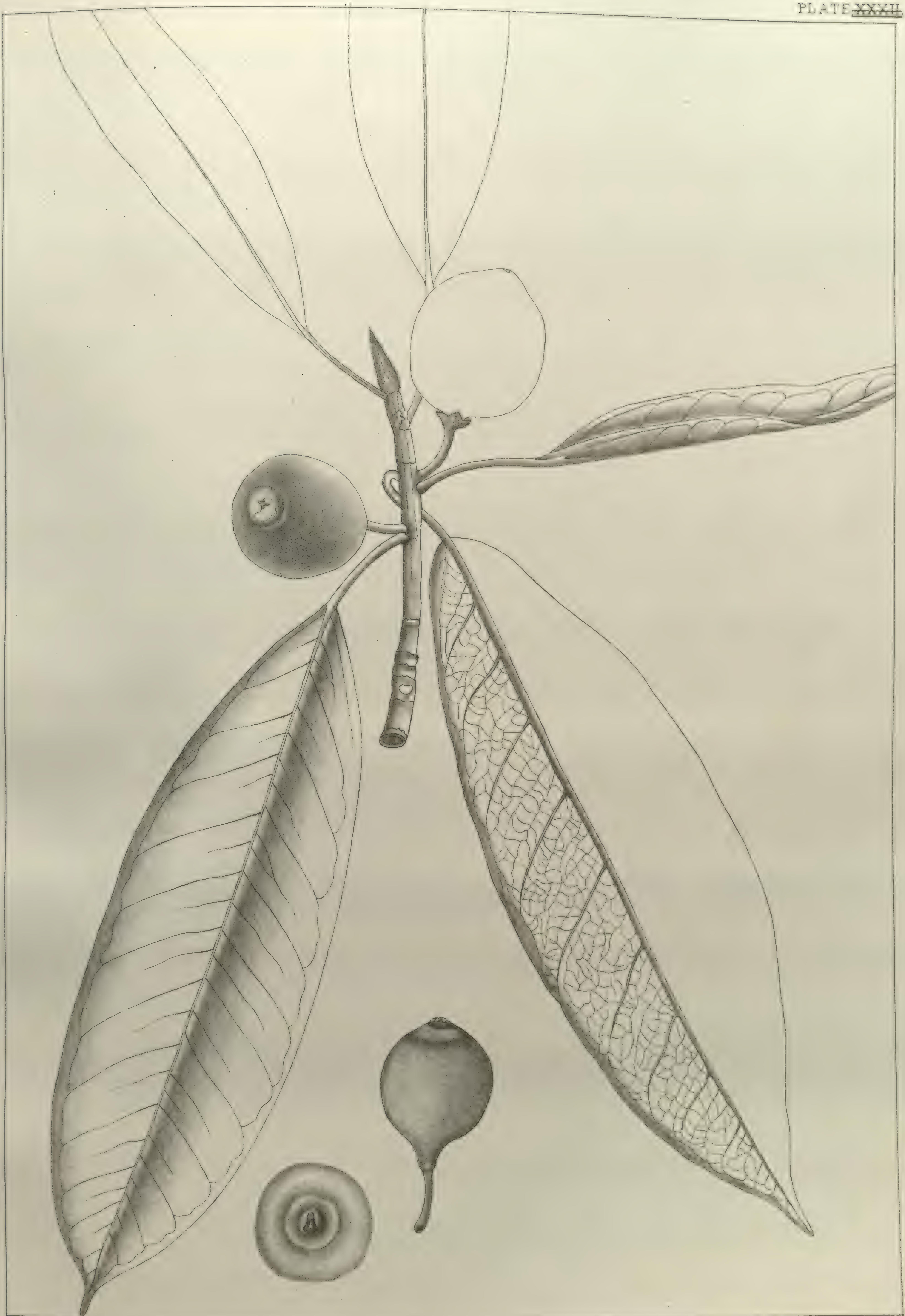
FICUS TOMENTOSA, Roxb.



G C Das del Bot. Garden Calcutta.

Lith. by H. L. Pal Govt. School of Art Calcutta.
W Newman & Co. Ld. Imp.

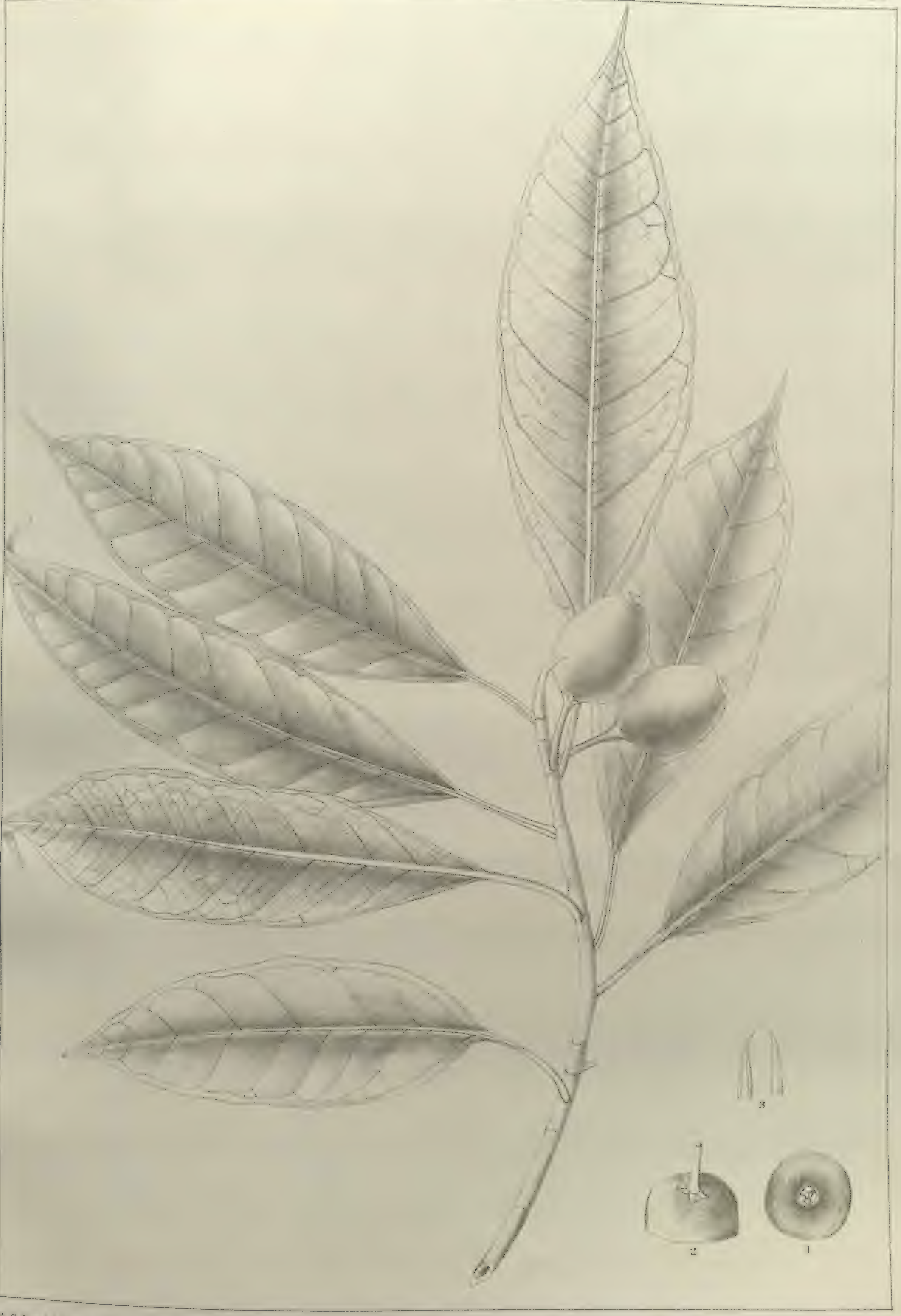
FICUS BRACTEATA, Wall.



G. C. Das del. Bot. Garden Calcutt.

Lith by D. Neogy, Govt. School of Art Calcutta

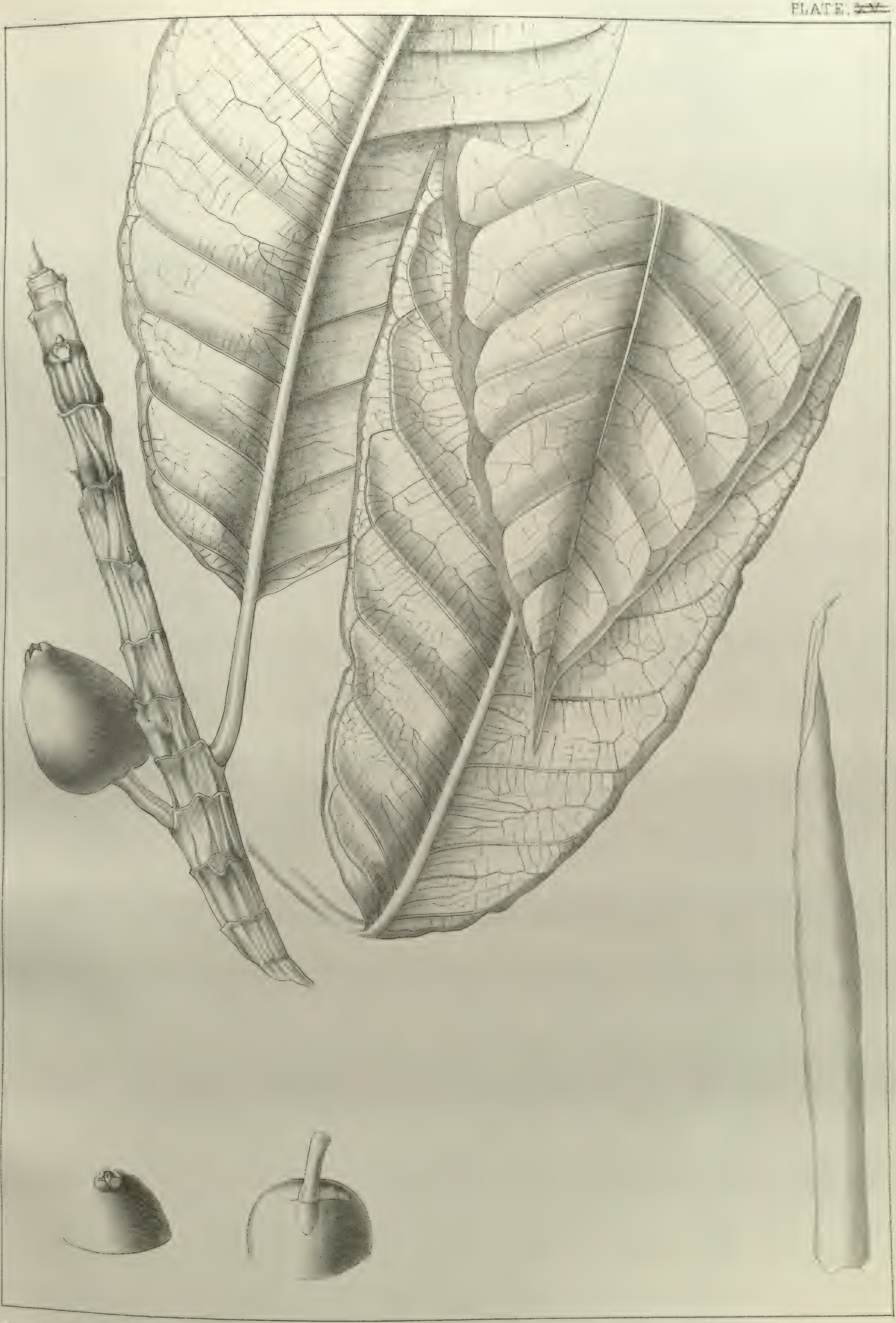
FICUS CHRYSOLEPIS, Miq.



G. C. Das del. Bot. Garden Calcutta.

Lith: by R. N. Das Govt. School of Art Calcutta.
W. Newman & Co. Ld., Imp.

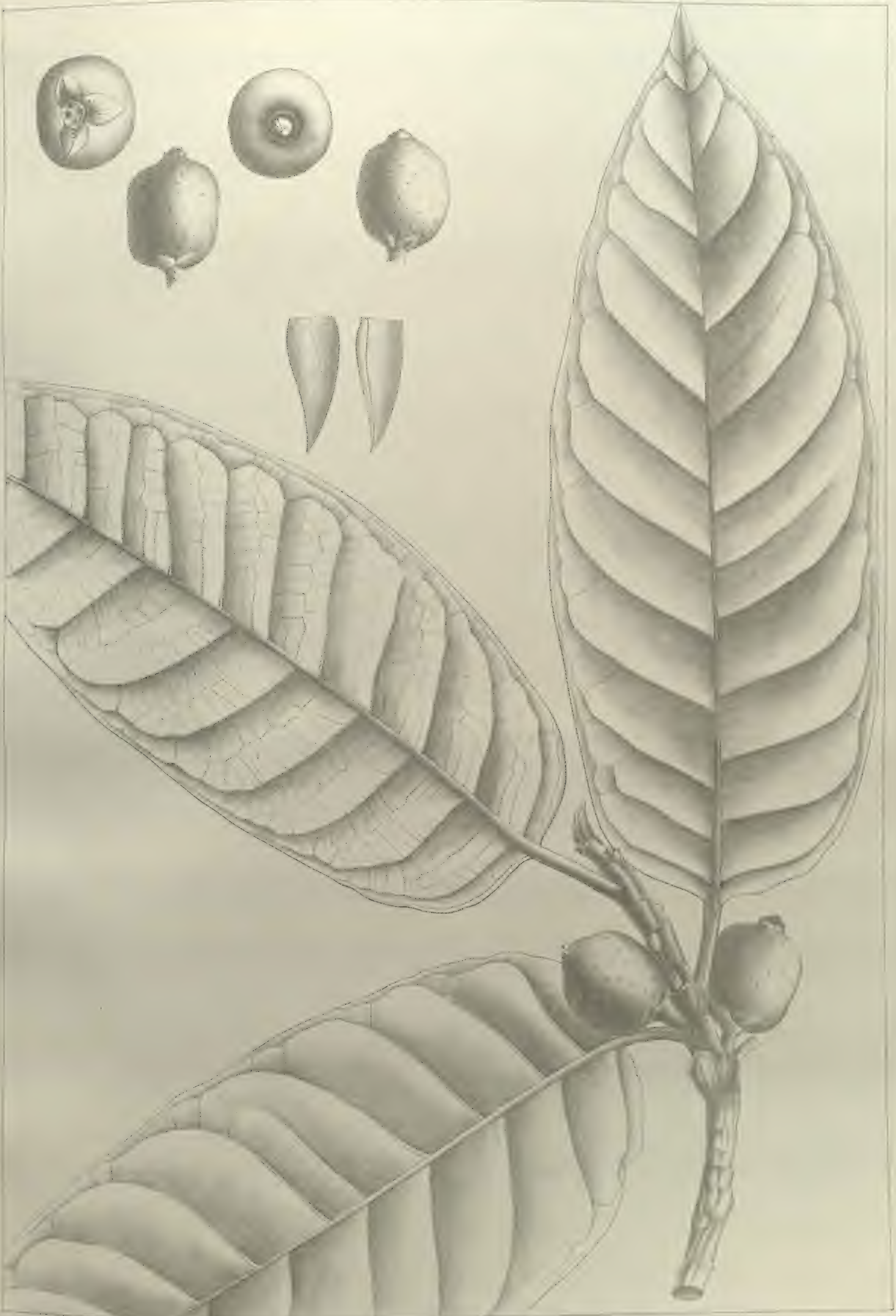
FICUS PRUNIFORMIS, Blume.



Drawn by Gopal Chandra Das, Bot. Garden Calcutta.

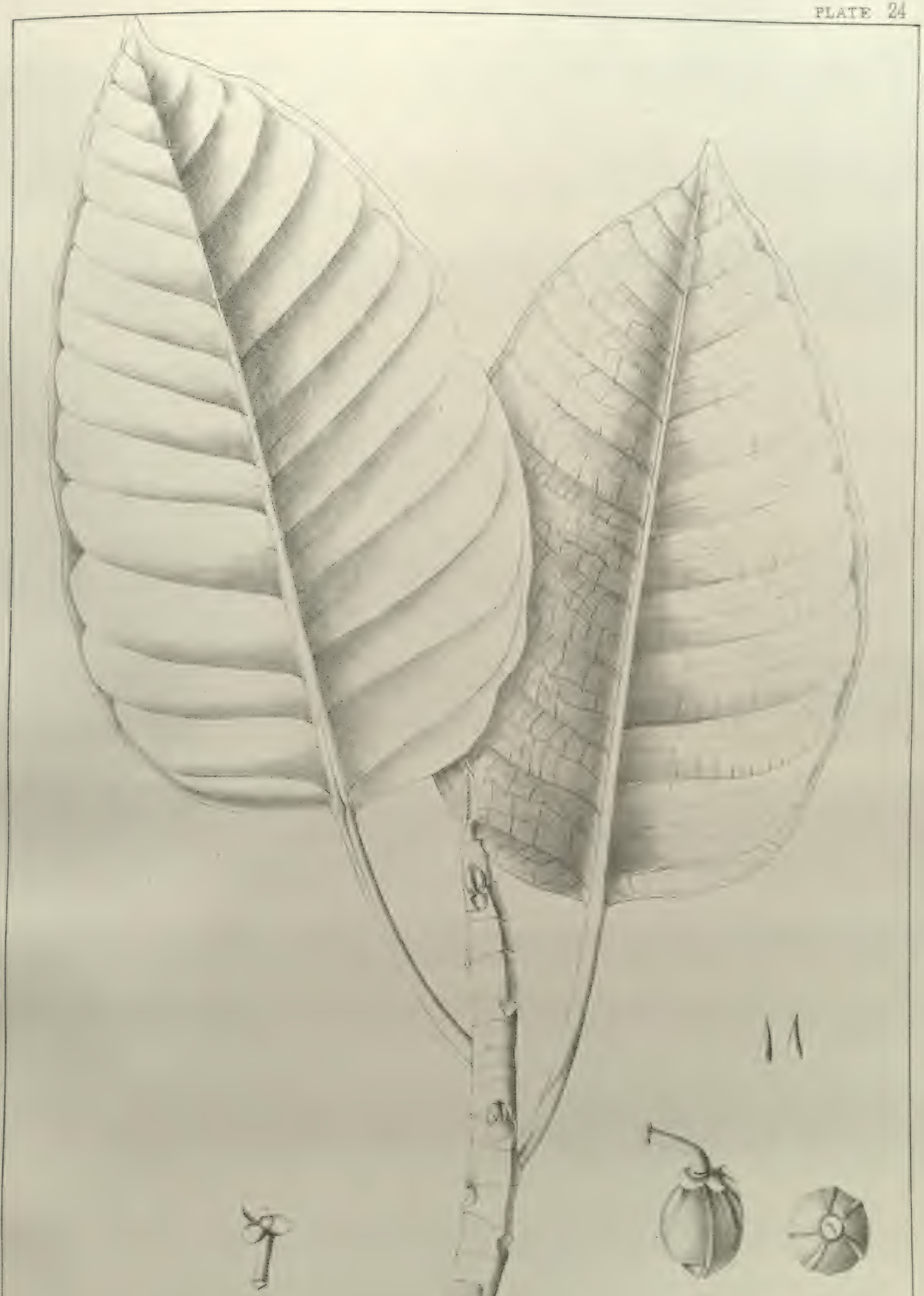
Lithographed by Jadab Chandra Chakerbutty, Govt. School of Art. Calcutta.

FICUS ANNULATA Blume



Drawn by Gopal Chunder Das Bot. Garden Calcutta. [illegible]

FICUS ANNULATA, Blume; VAR. VALIDA.

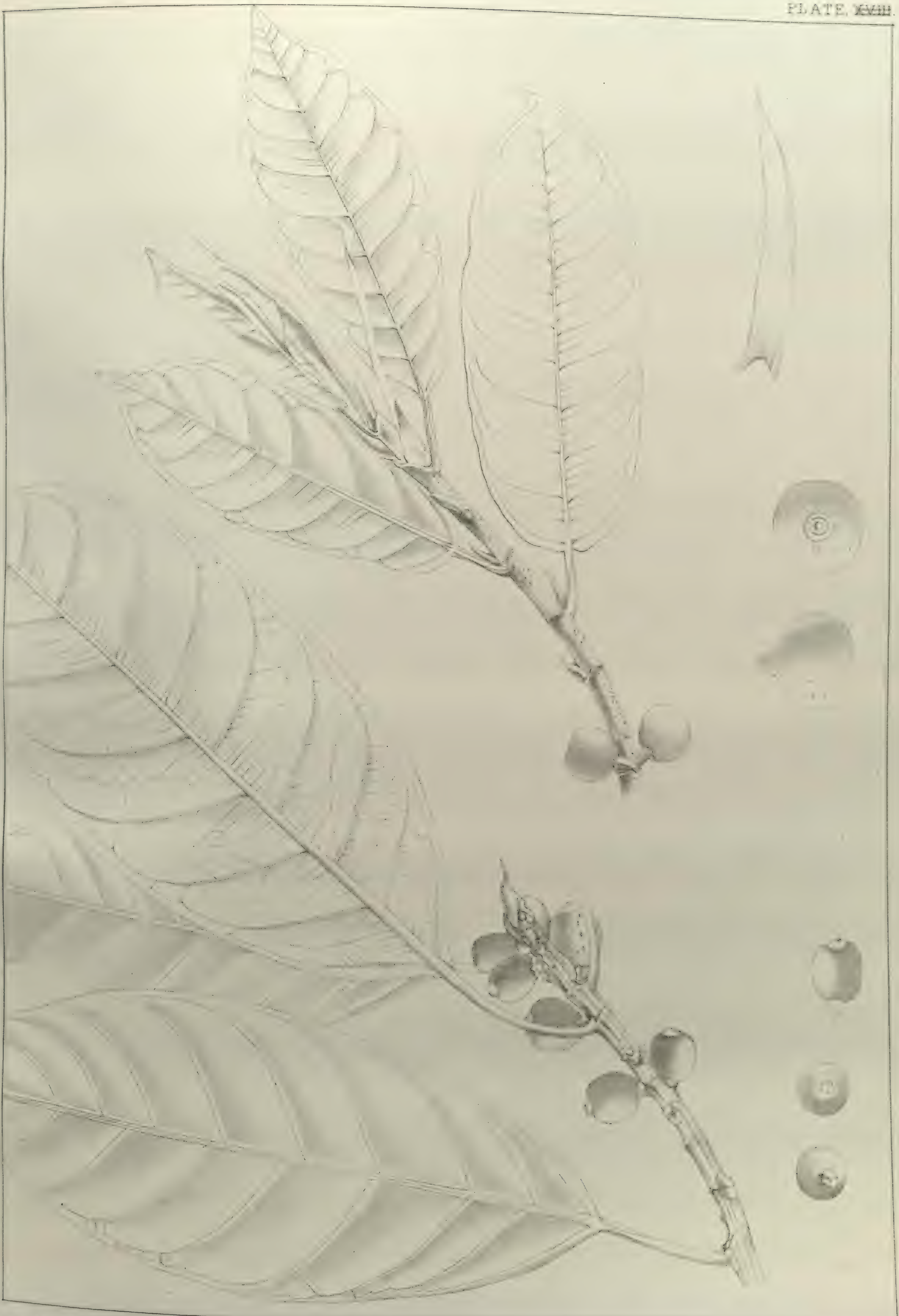


G.C. Das del. Bot. Garden Calcutta.

Lith: by H.C. Ghosal Govt. School of Art Calcutta.
W. Newman & Co. Ld. Imp.

FICUS BEDDOMEI, King.

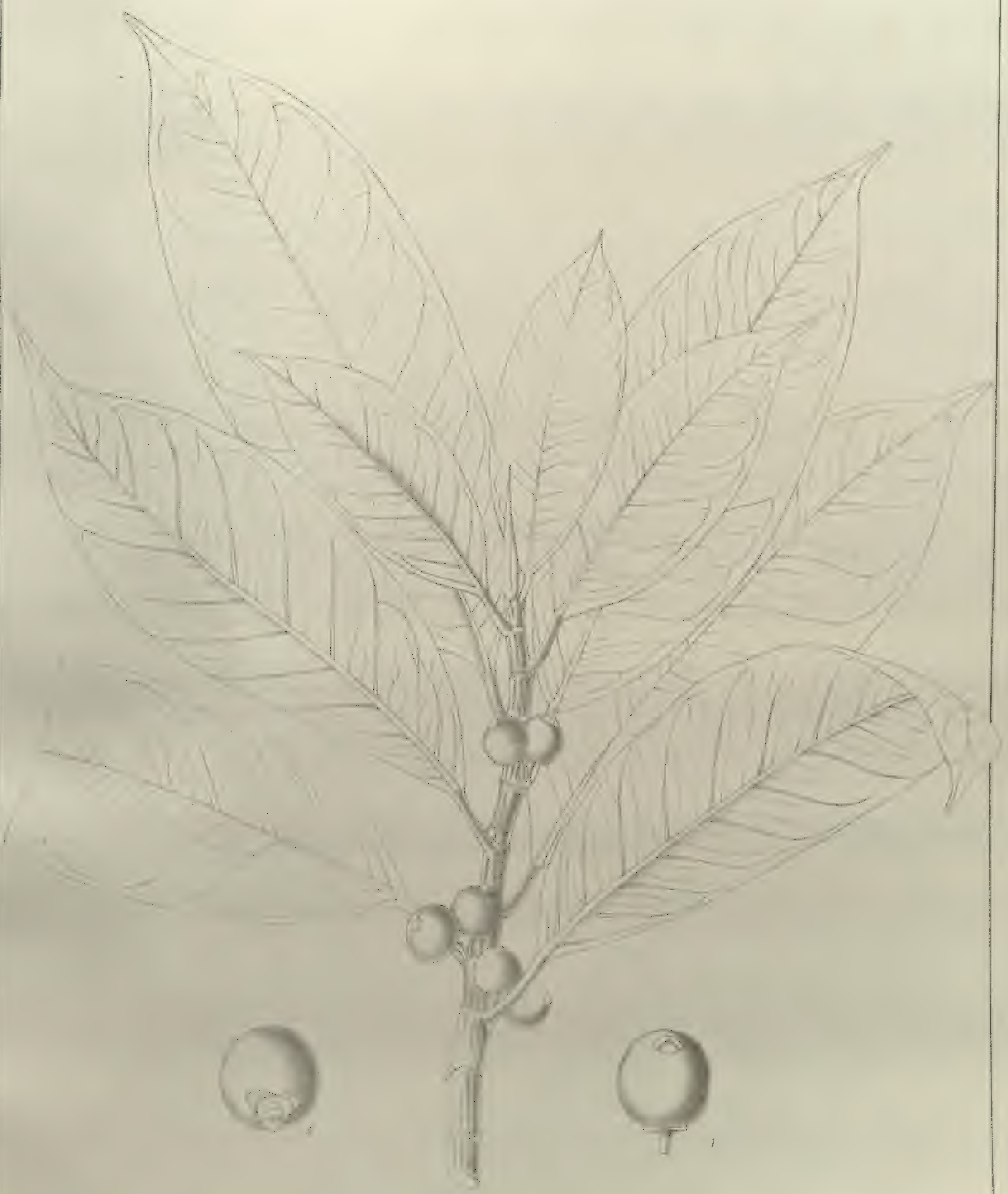
PLATE. ~~XVIII.~~ 25



G. C. Das del. Bot Garden Calcutta.

Lith. by D. Neogy Govt School of Art Calcutta.

FICUS GLOBOSA, Blume.

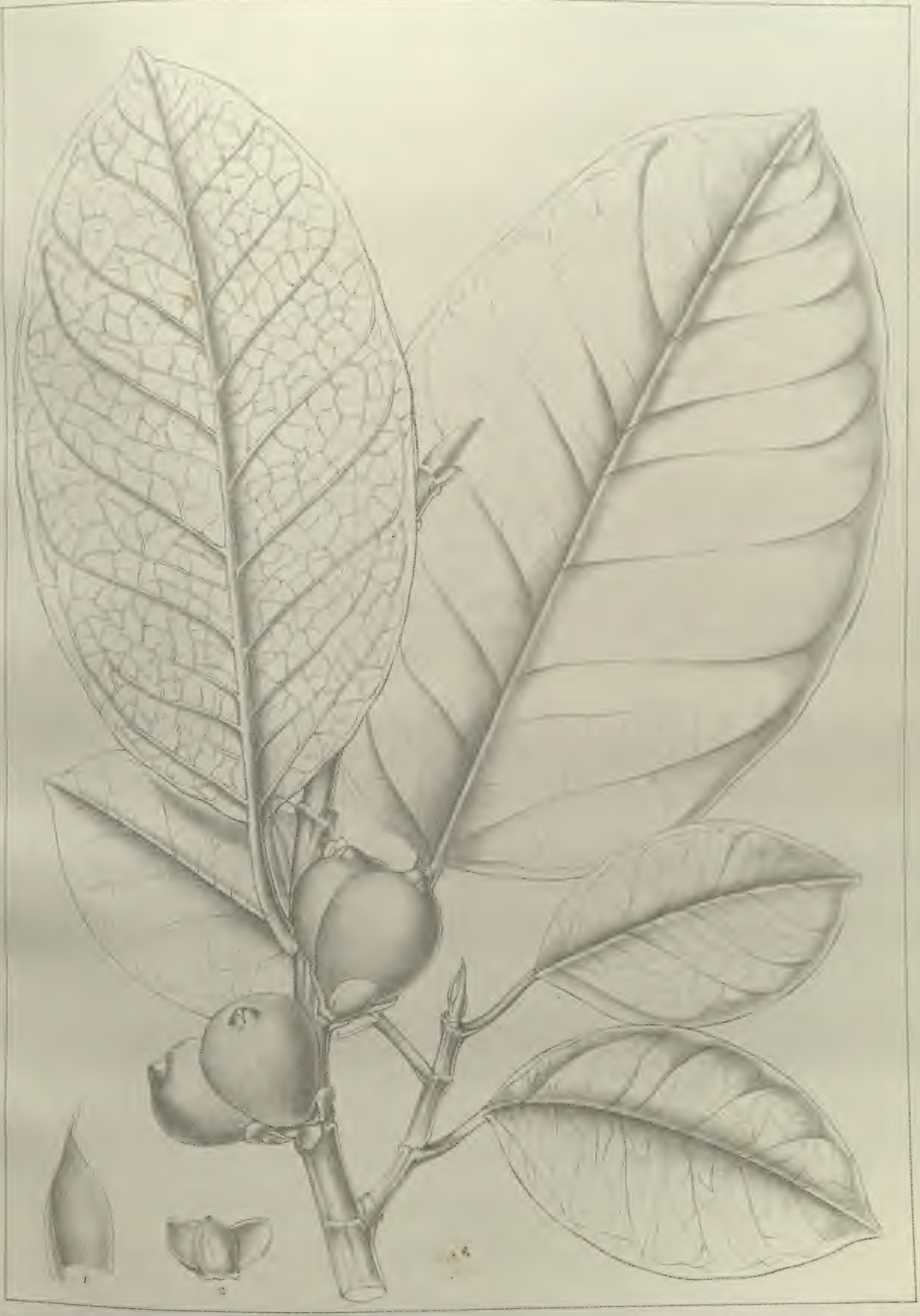


M. Smith del.

Lith: by D. Neogy Govt. School of Art Calcutta.

FICUS TRAVANCORICA, King.

PLATE 27

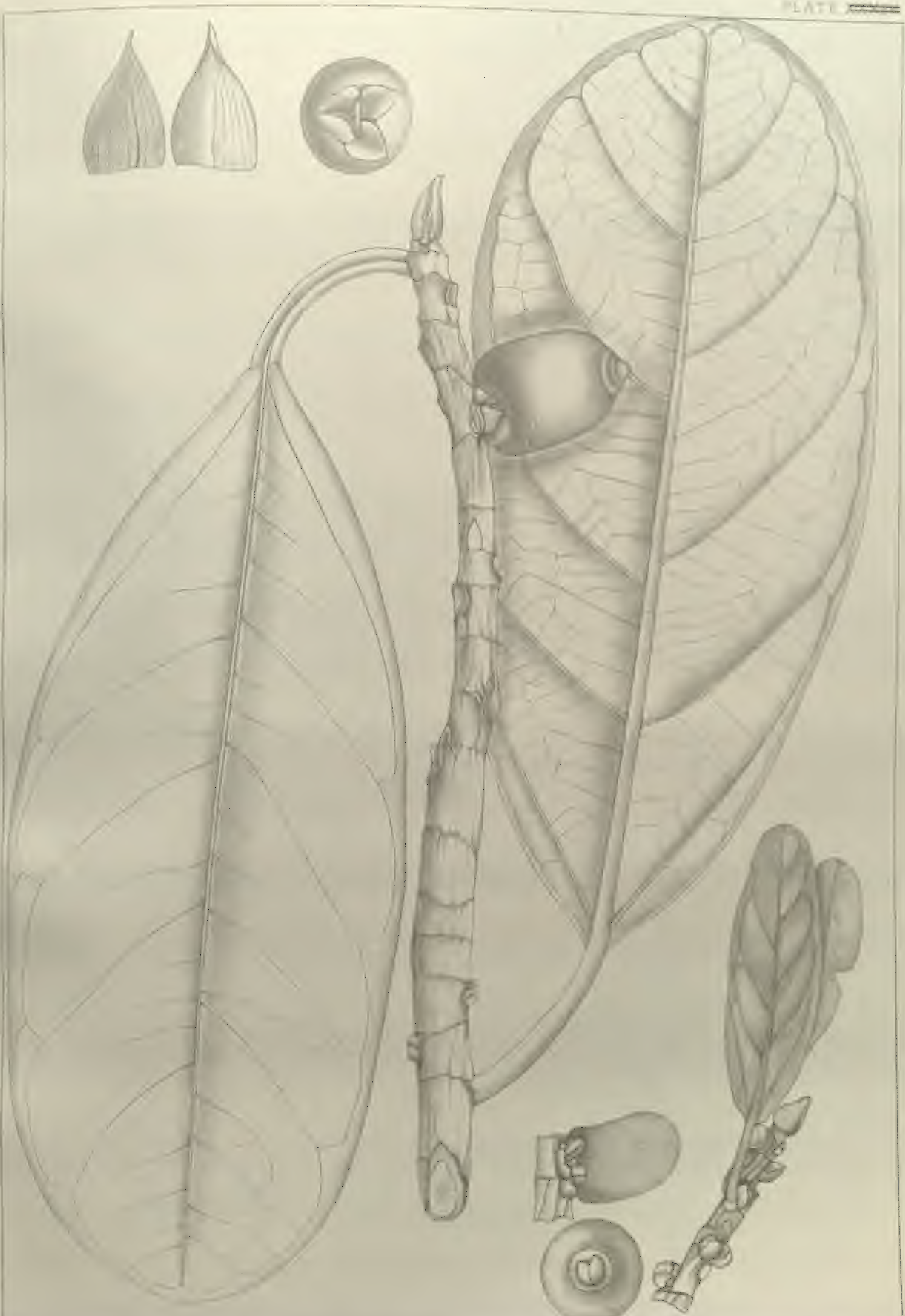


[illegible] del.

Lith. by B. K. Roy Govt. School of Art Calcutta.

FICUS JUGLANDIFORMIS, King.

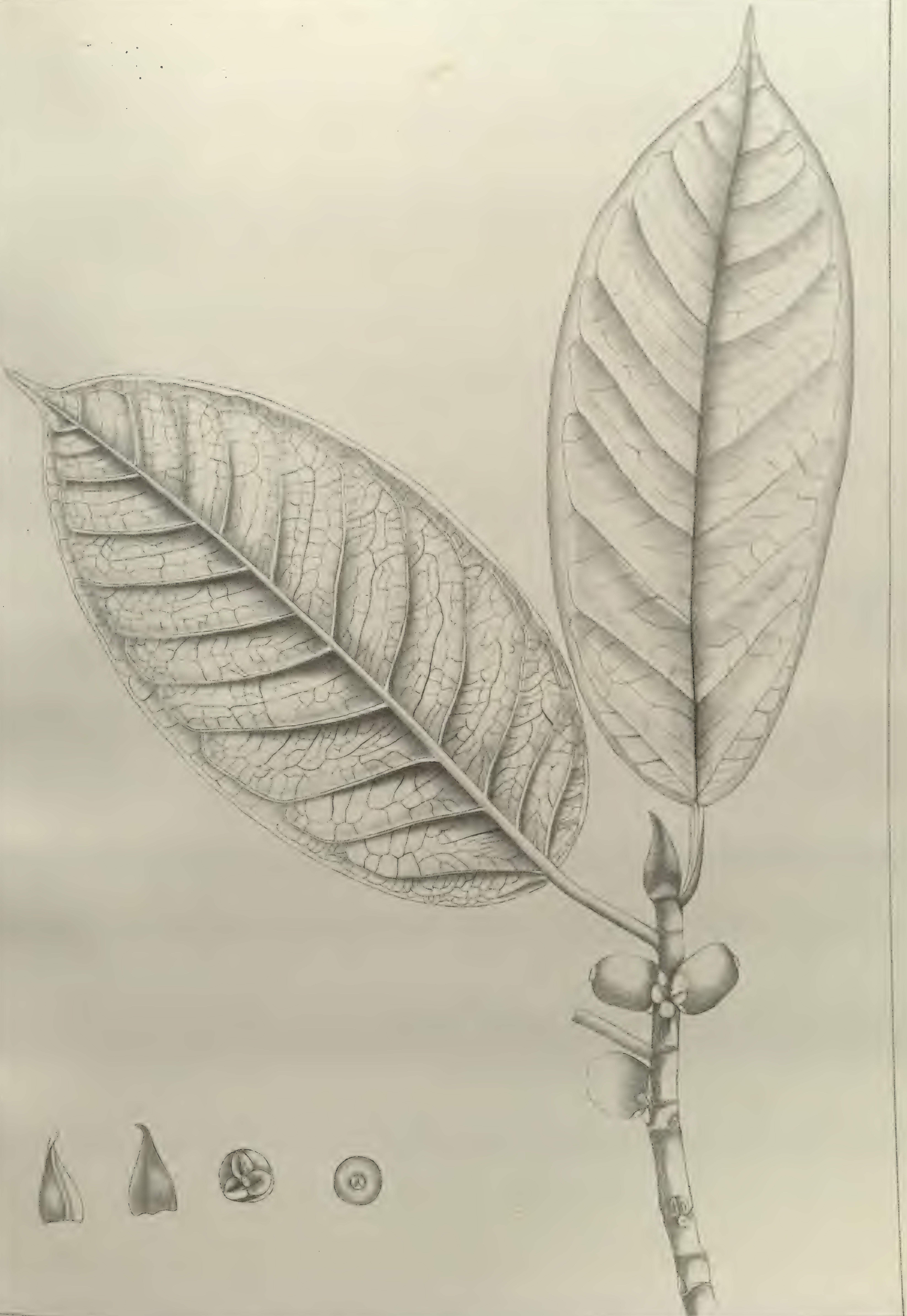
PLATE 28



G. C. Das del. Bot. Garden Calcutta.

Lith. by H. L. Pal Govt. School of Art Calcutta.

FICUS XYLOPHYLLA, Wall.

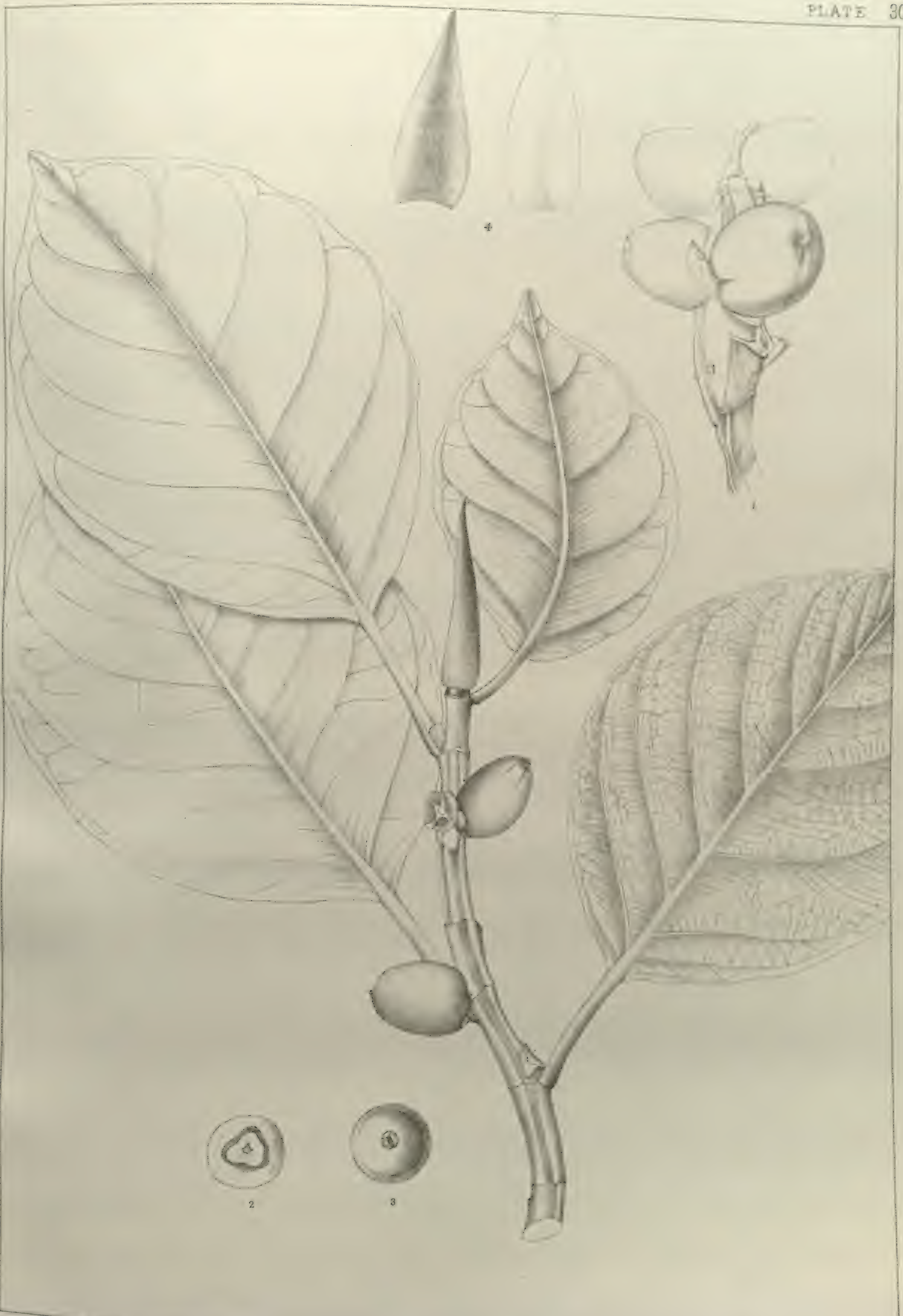


G. C. Das del. Bot. Garden Calcutta.

Lith. by D. Neogey Govt. School of Art Calcutta.

FICUS FORSTENII, Miq.

PLATE 30

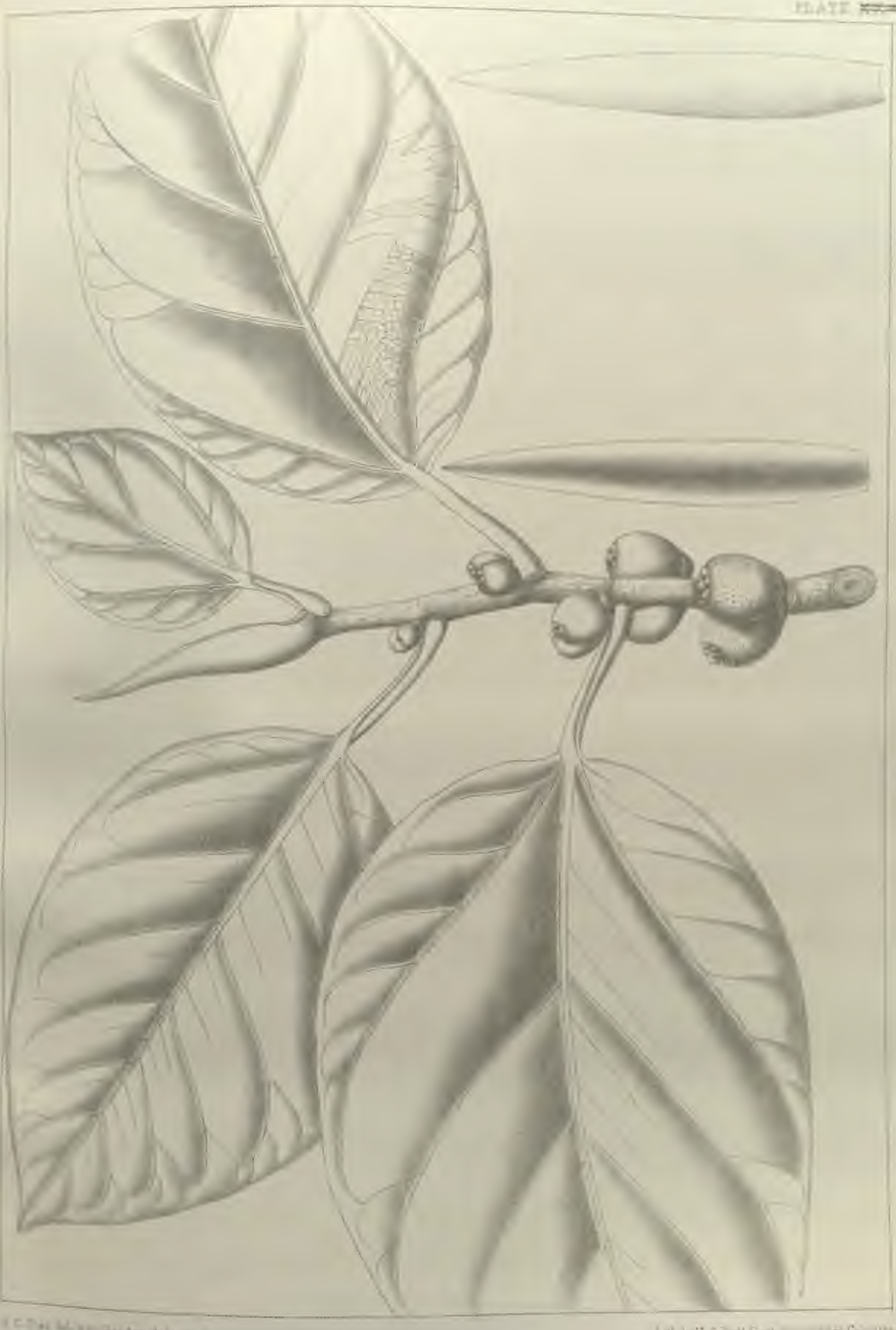


G. C. Das del. Bot. Garden Calcutta.

Lith. by D. Neogy Govt. School of Art Calcutta.

FICUS ALTISSIMA, Blume.

PLATE ~~[illegible]~~ 30 a

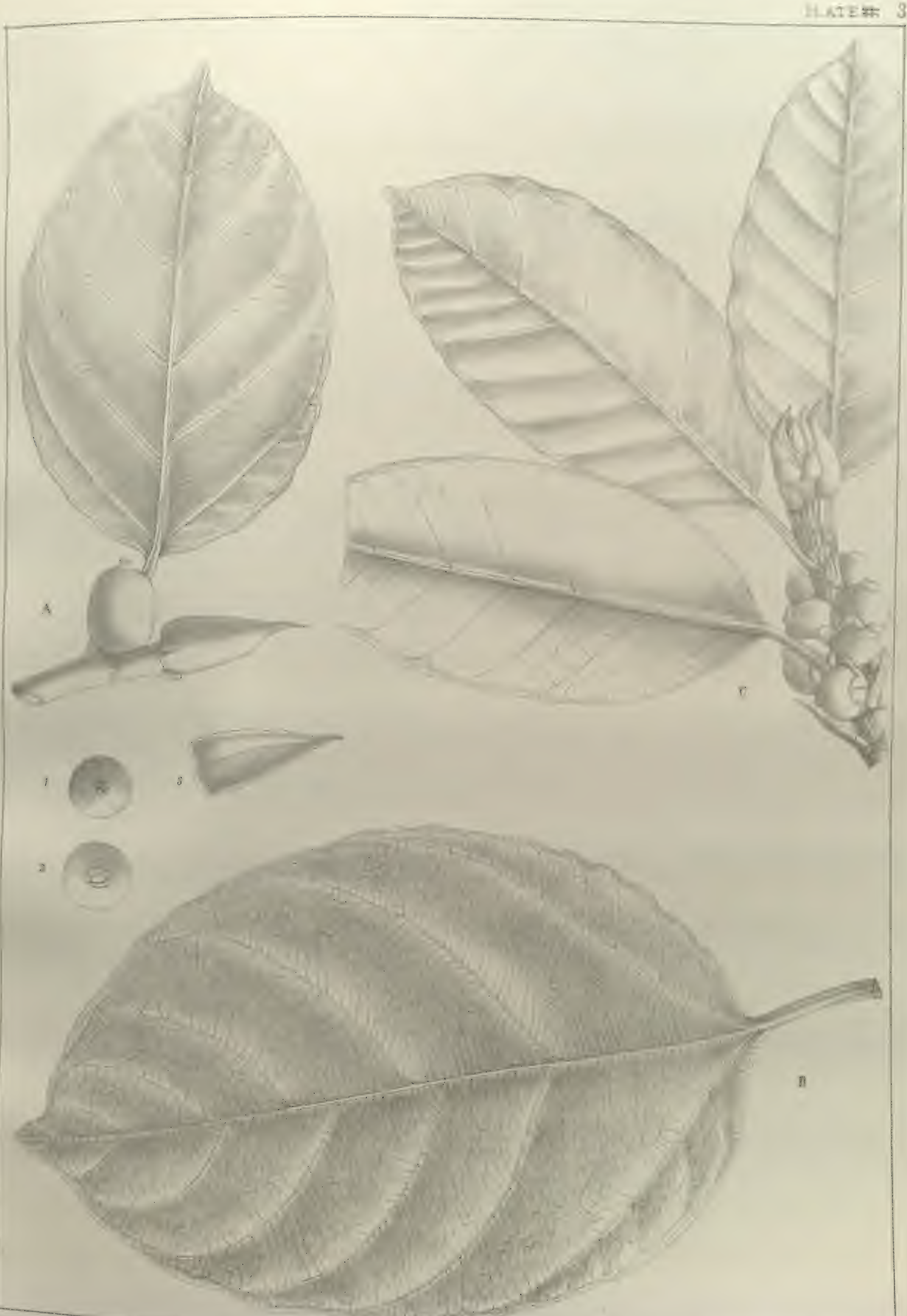


K. C. Das del. Roy. Bot. Garden Calcutta

Lith. by H. C. Dutt Govt. [illegible] Calcutta

FICUS LACCIFERA, Roxb.
= F. ALTISSIMA, Blume.

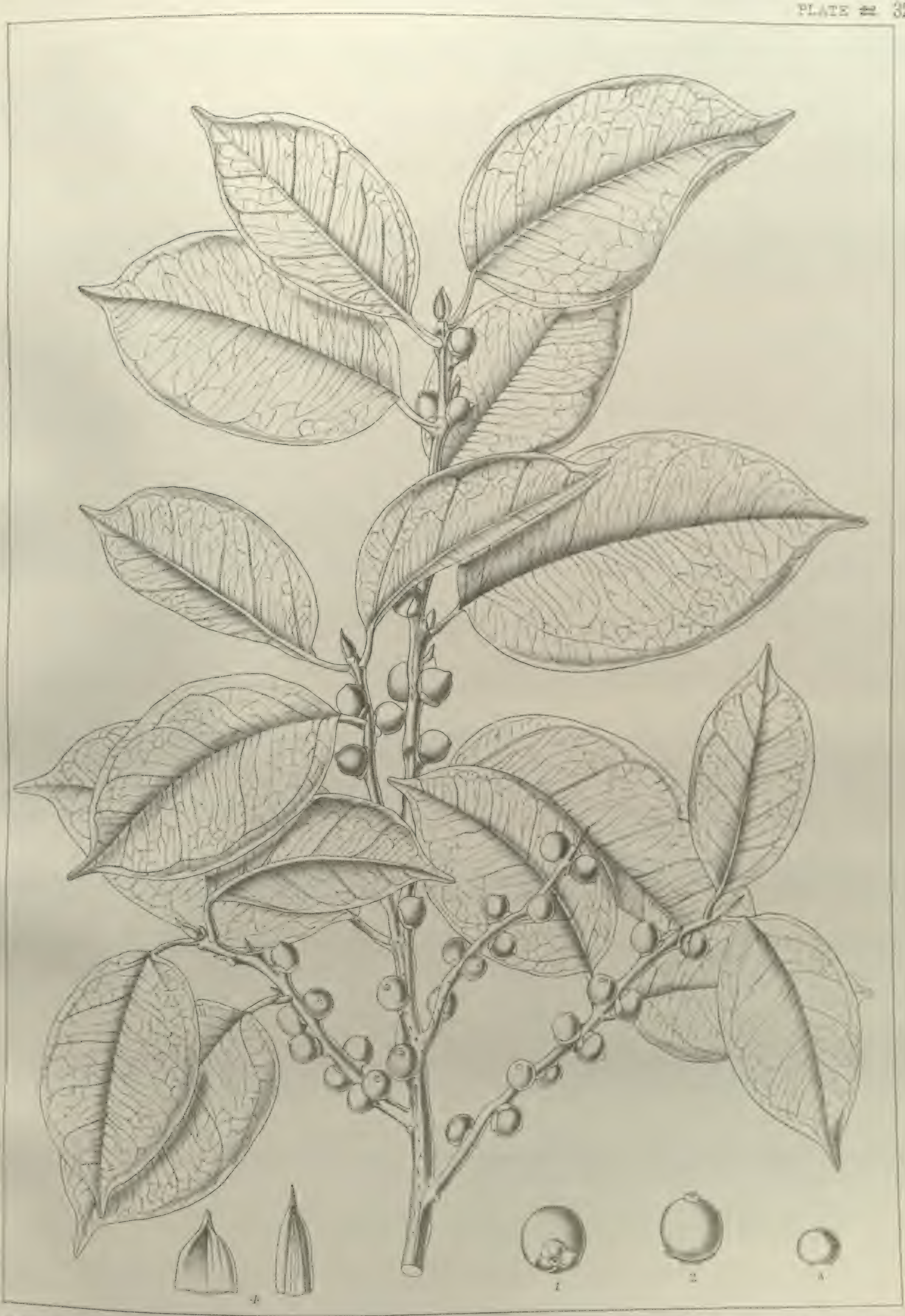
PLATE 31



[illegible] del. Bot. Garden Calcutta

Lith. by S. Banerji Govt. School of Art Calcutta.

FICUS ALTISSIMA, Bl. A. FORMA TYPICA. B. VAR. LACCIFERA. C. VAR. FERGUSSONI

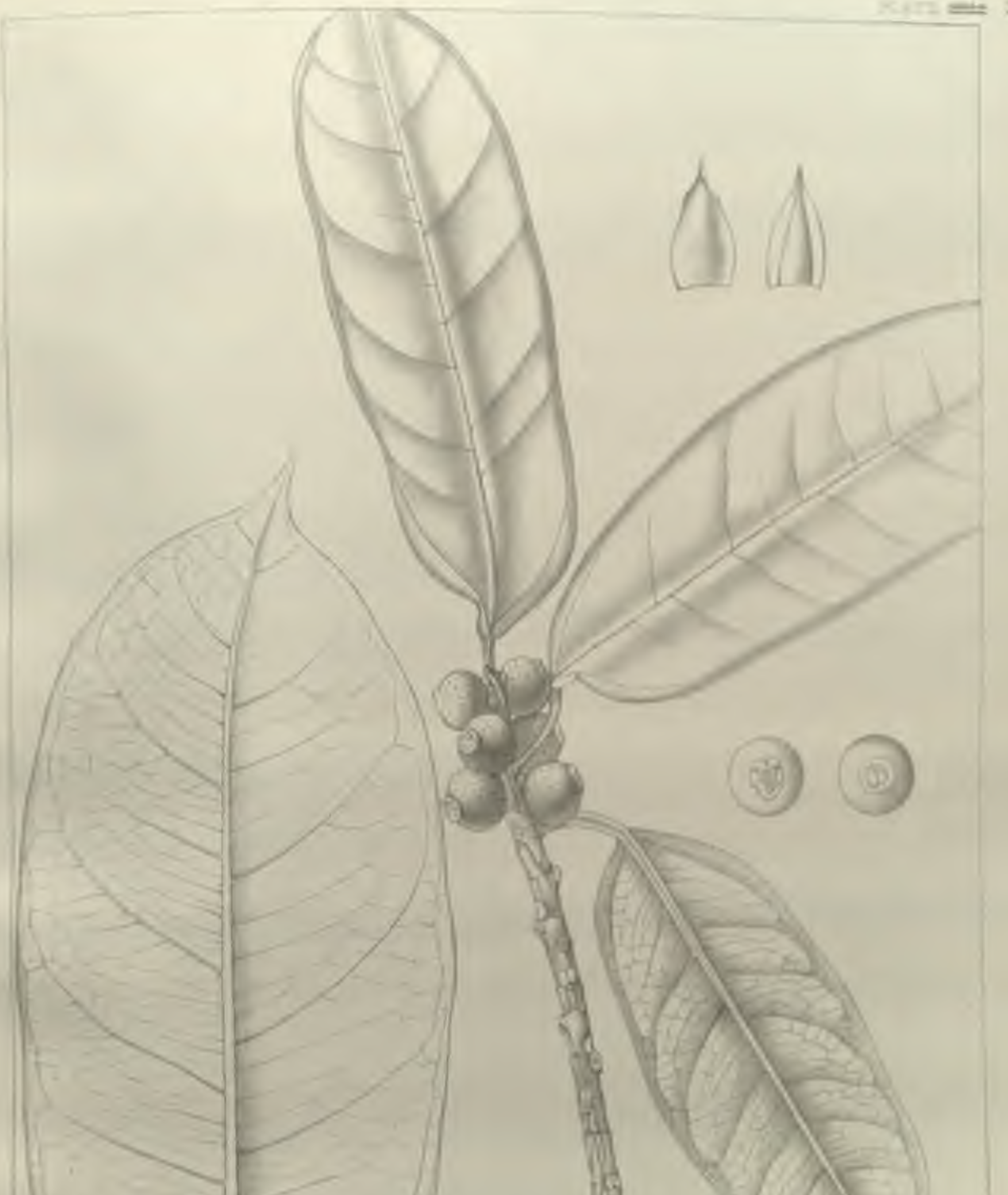


M. [illegible] del.

Lith. by D. [illegible] Govt. School of Art [illegible]
[illegible]

FICUS CYCLONEURA, Miq.

PLATE 33

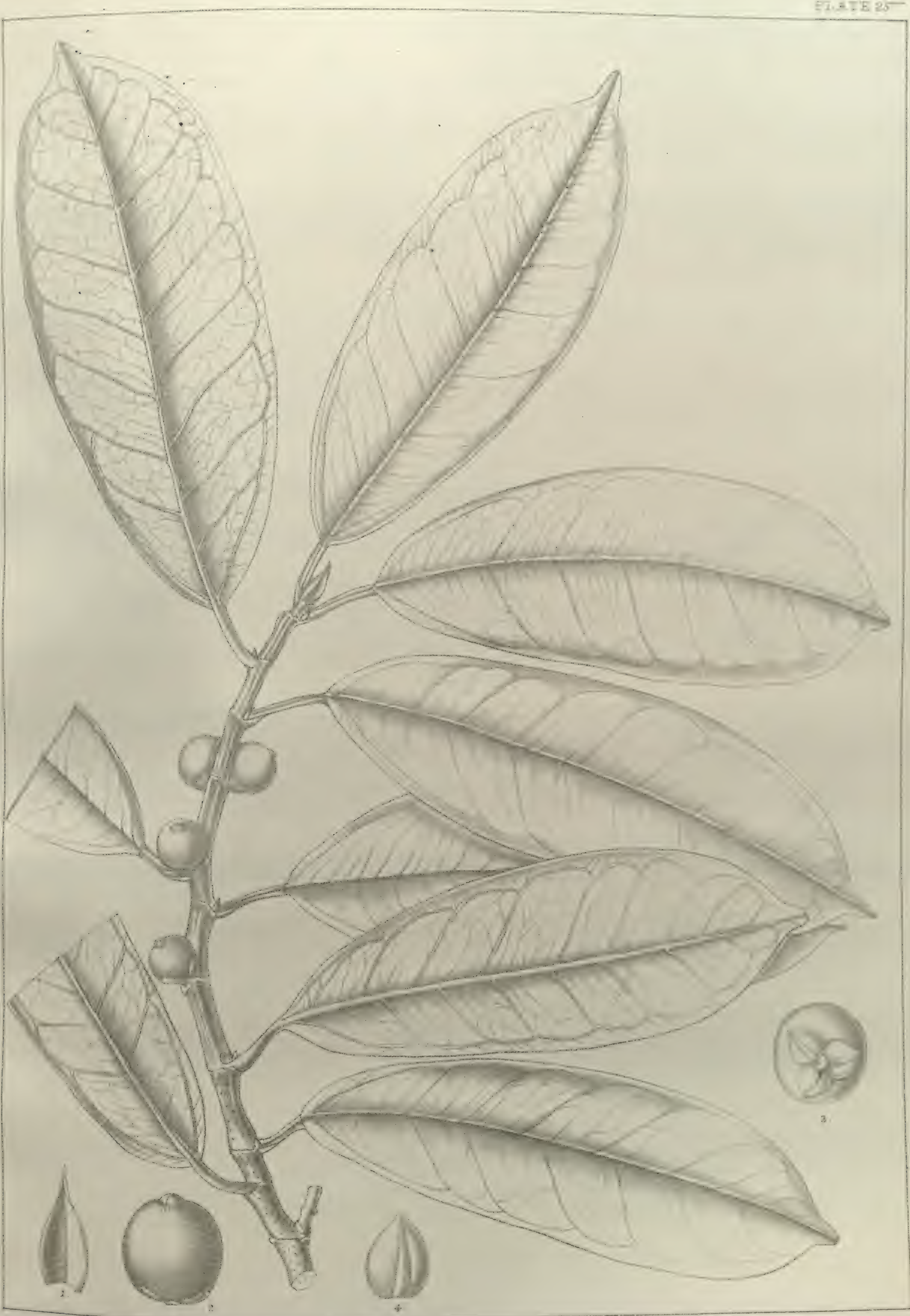


[illegible]

[illegible]

FICUS LOWII, King.

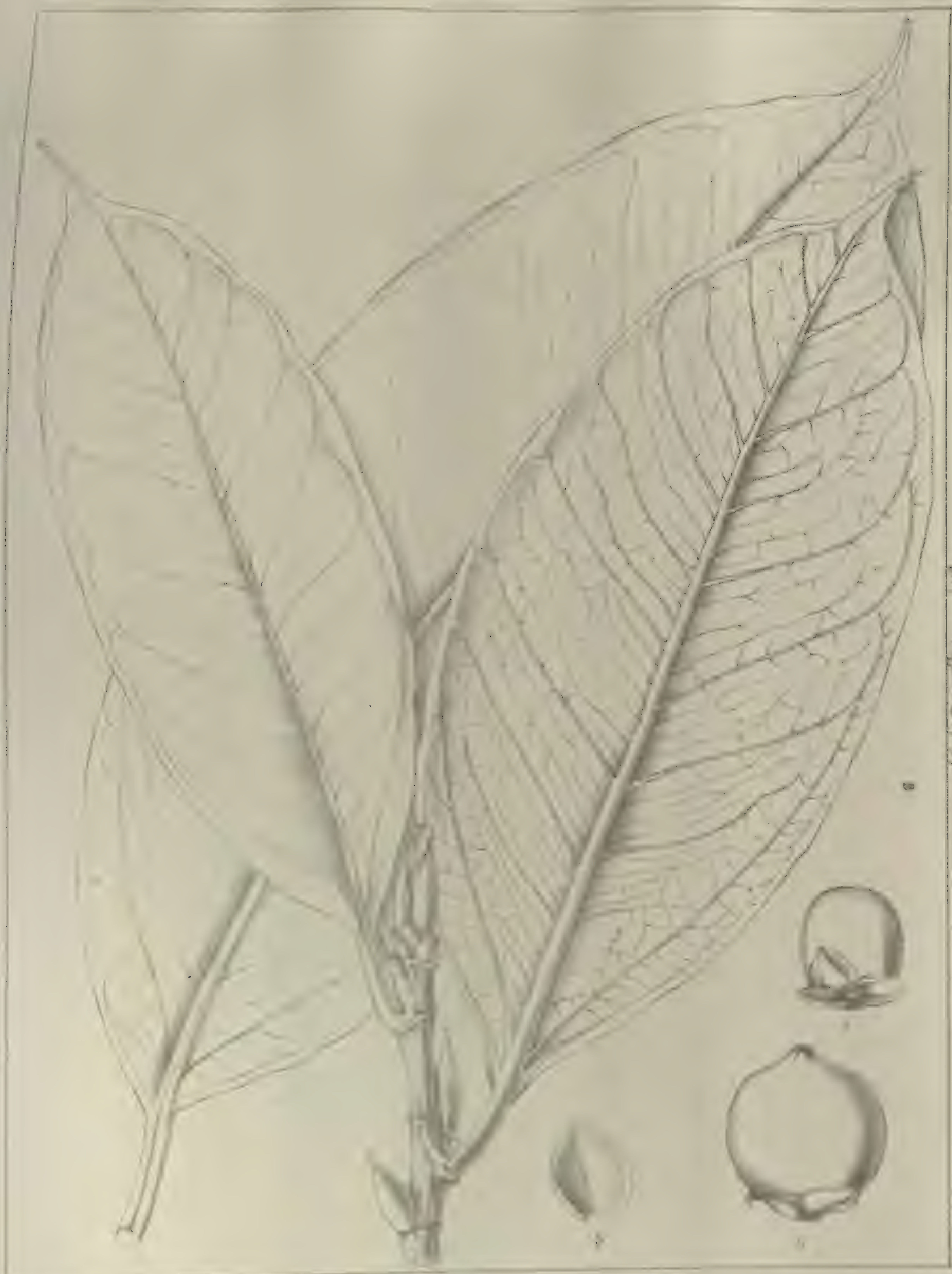
PLATE 25 34



M. Smith del.

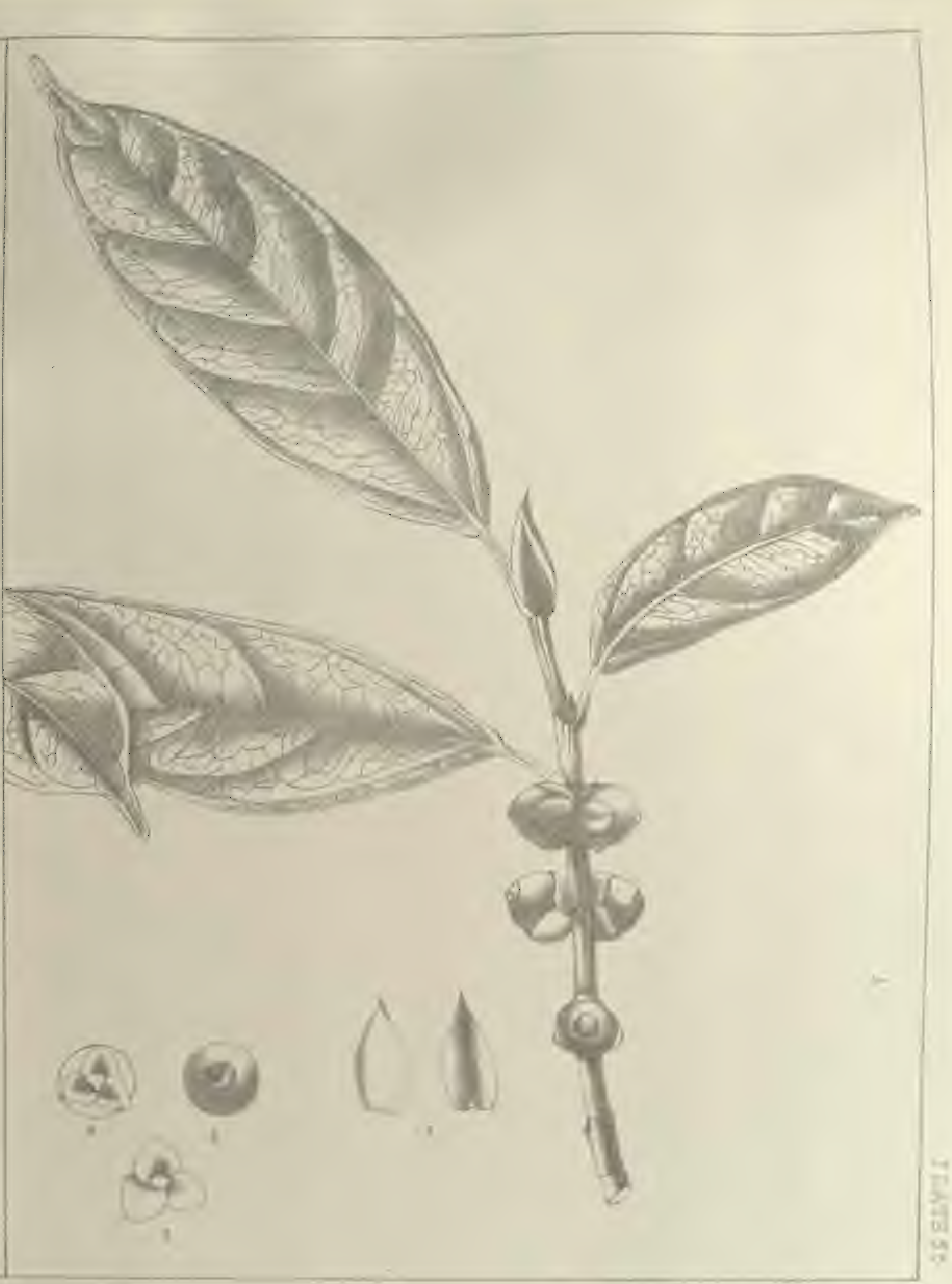
Lith: by B. L. Mookerji Govt. School of Art Calcutta.

FICUS PACHYPHYLLA. King.



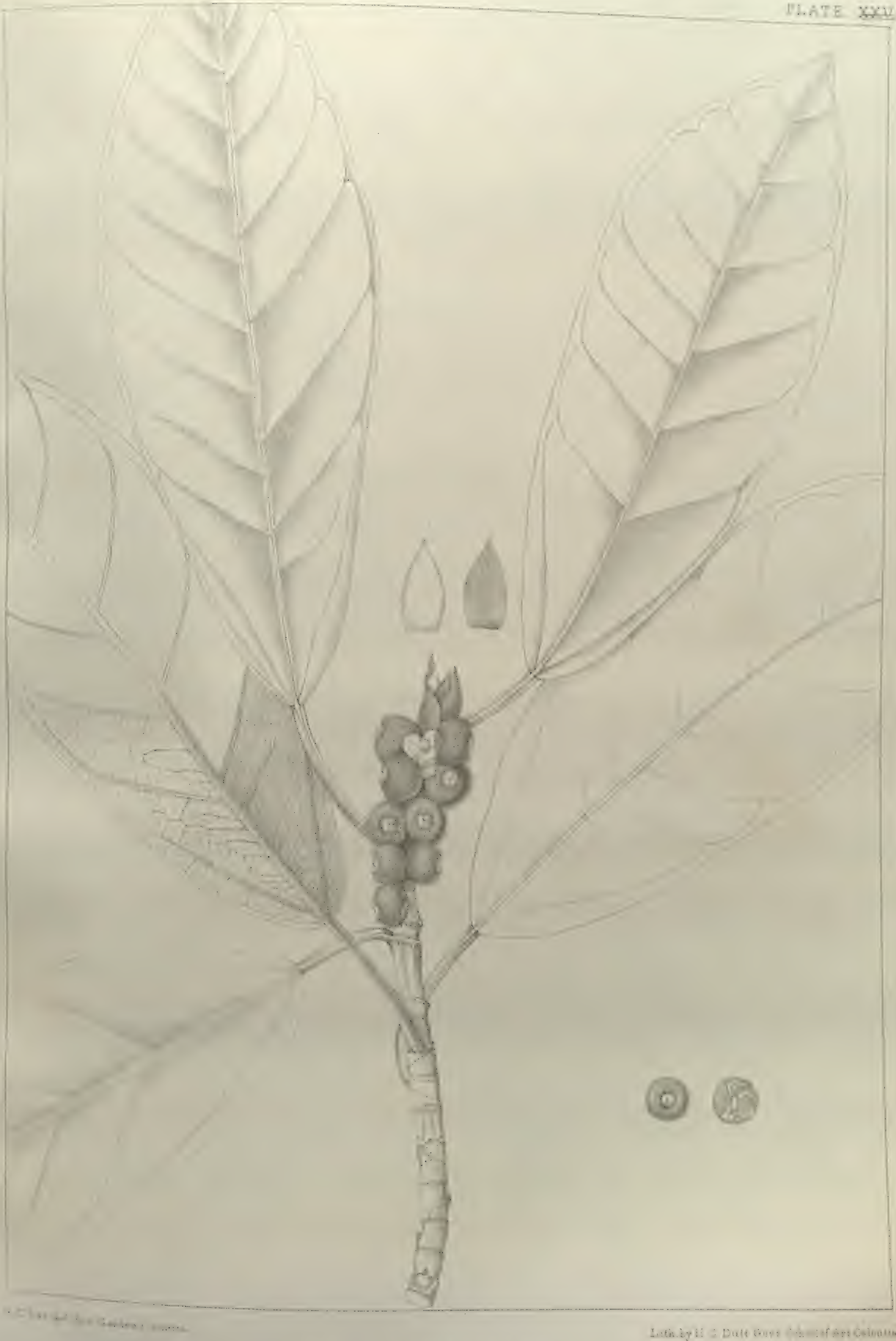
A. C. Das del. Roy. Bot. Garden, Calcutta.

FICUS KORTHALSII, var. BECCARIANA.



Lith. by [illegible]

FICUS SUMATRANA, Miq.

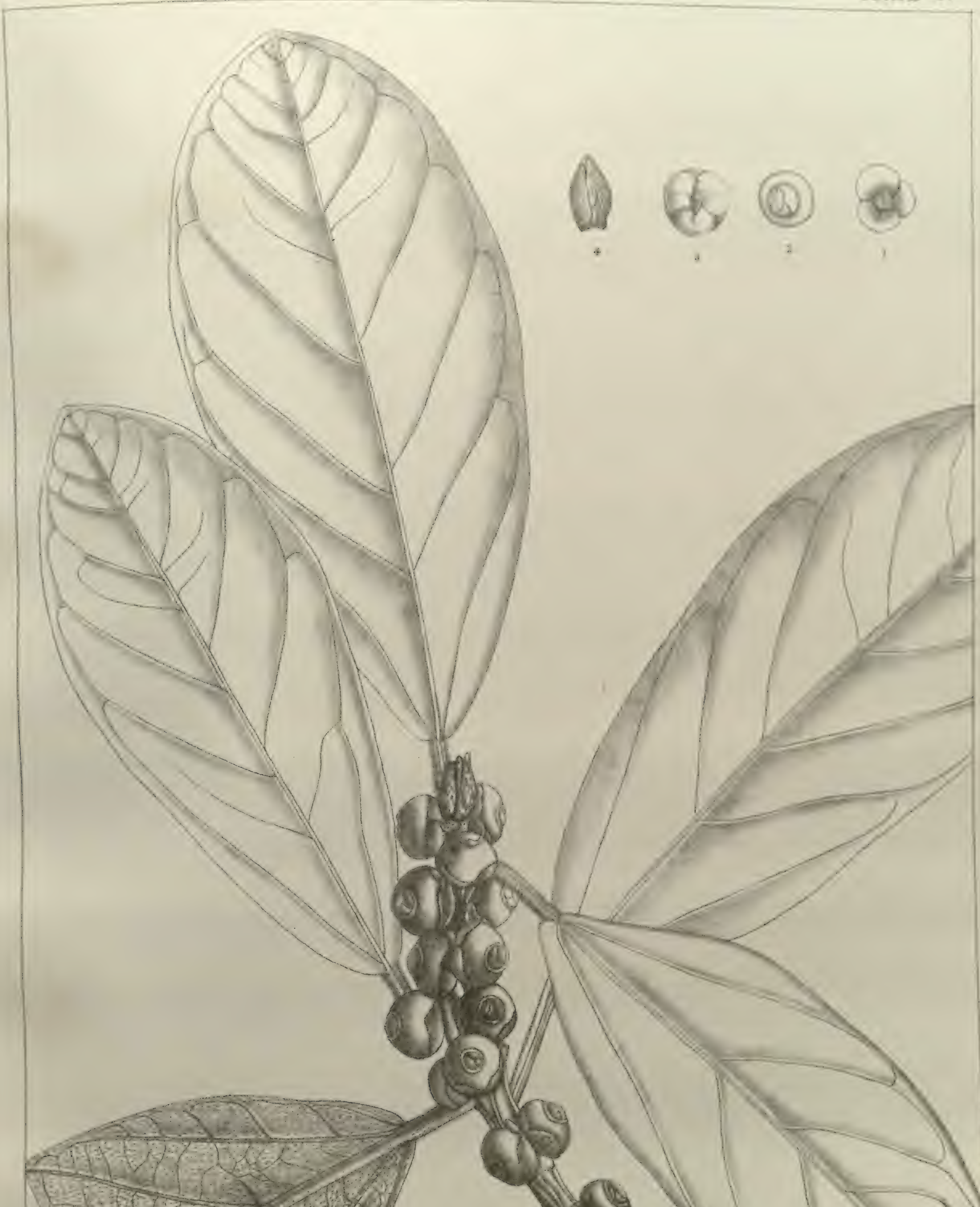


[illegible] Bot. Garden, Calcutta.

Lith. by H. C. Dutt Govt. School of Art Calcutta.

FICUS CONSOCIATA, Blume.

PLATE 37

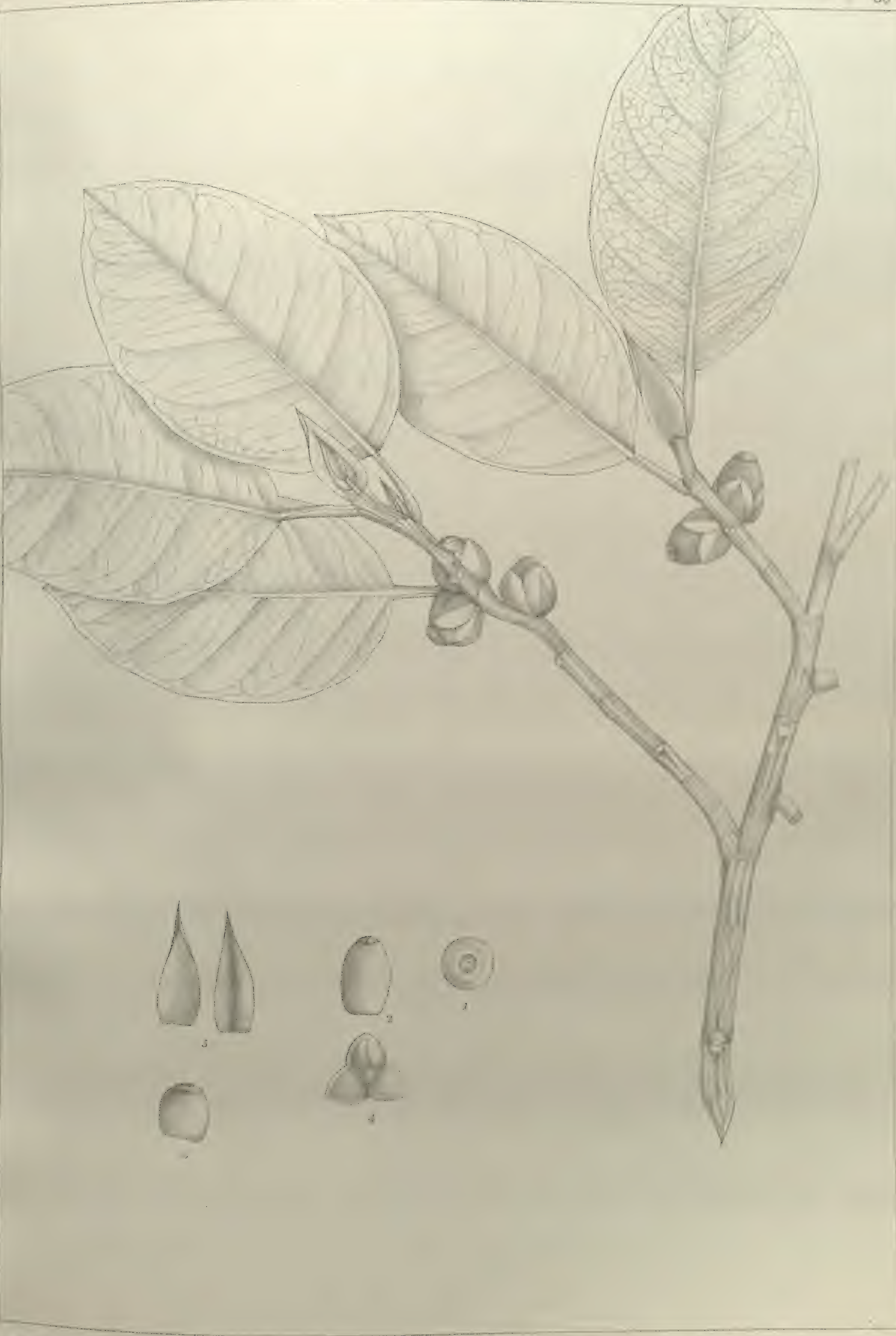


G. C. Das del. Bot. Garden Calcutta.

Lith by S. Banerji. Govt. School of Art Calcutta.

~~FICUS MURTONI, King.~~

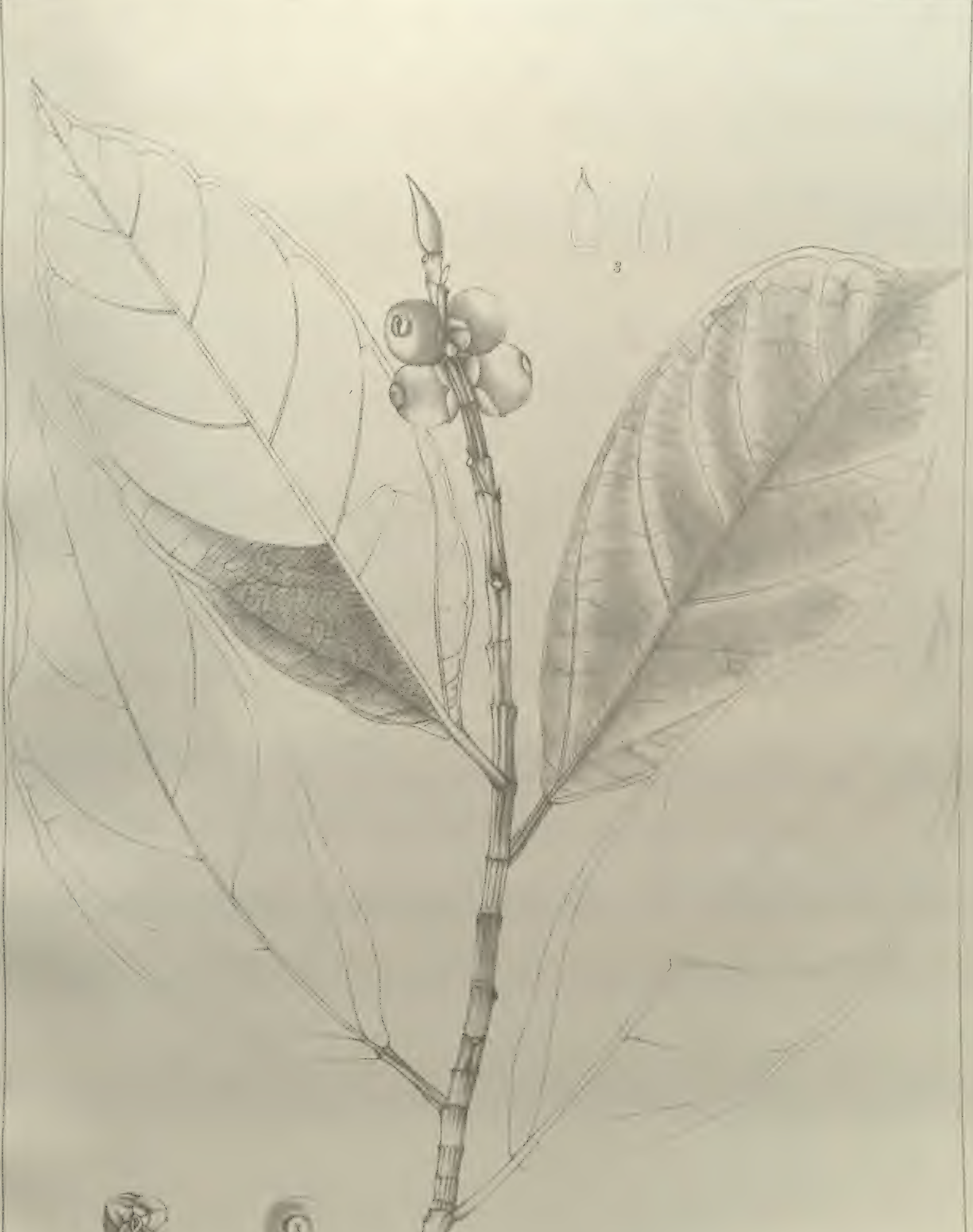
FICUS CONSOCIATA, Bl. var. Murtoni.



S. P. Das del. Bot. Garden Calcutta.

Lith: by D. Bagg, Govt. School of Art, Calcutta.
W. Newman & Co. Ld. Imp.

FICUS INVOLUCRATA, Blume.

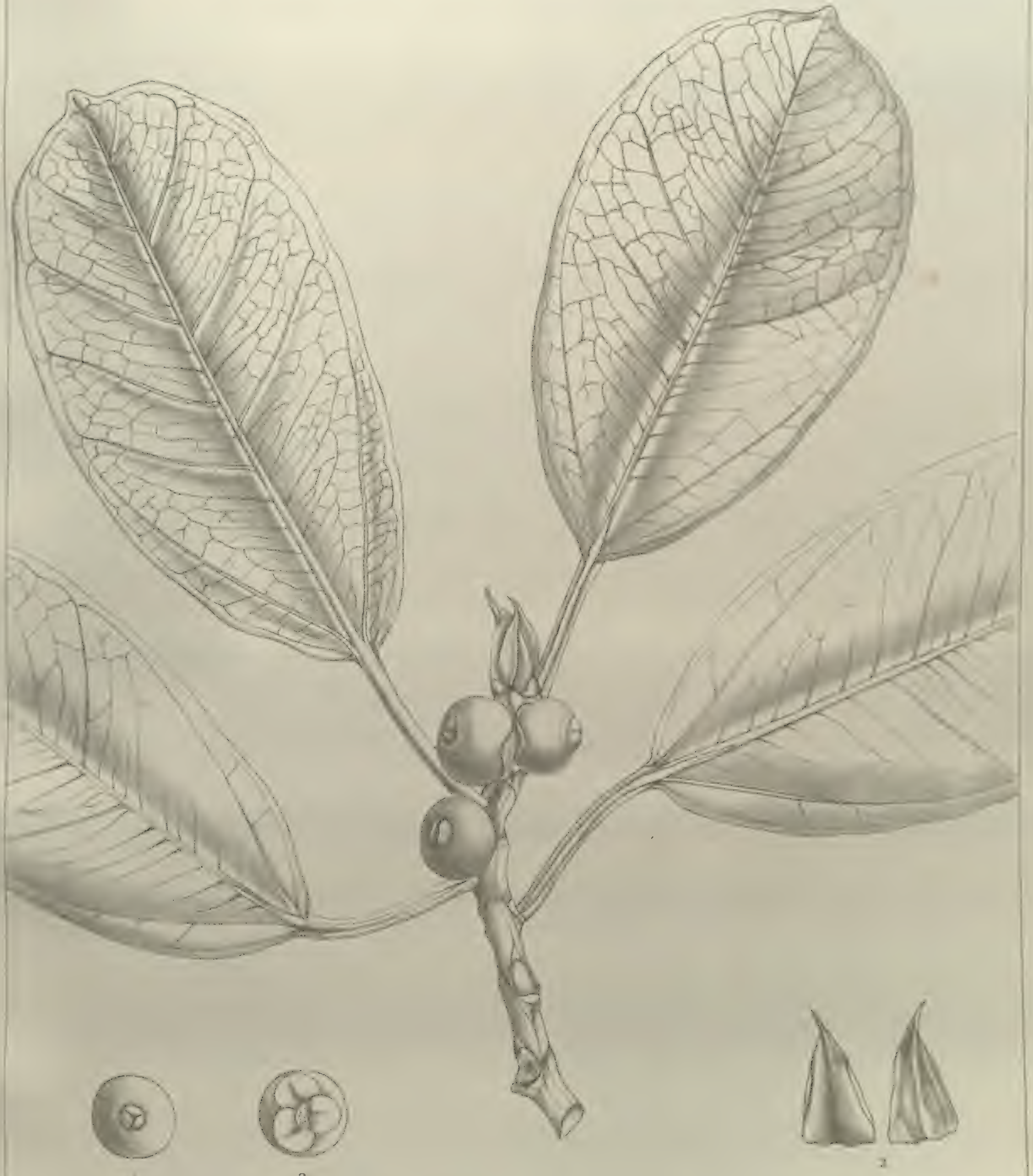


[illegible] Das del. Bot. Garden Calcutta.

Lith. by K.D. [illegible] Calcutta.

FICUS RIGIDA, Miq.

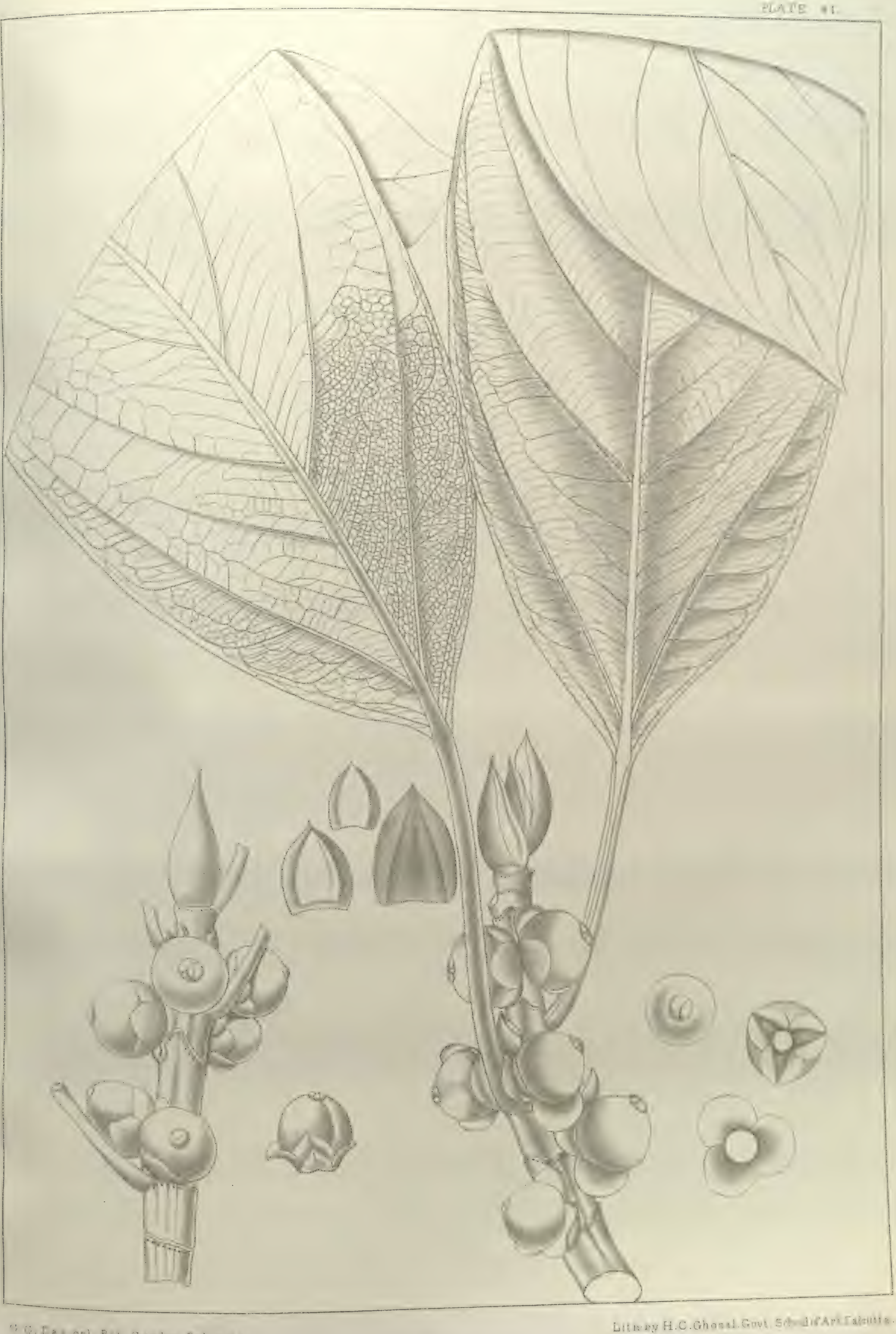
PLATE № 40



G. C. Das del. Bot. Garden Calcutta.

Lith. by C. D. Adhicary Govt. School of Art Calcutta.

FICUS PROCERA, Reinw.



G. C. Das del. Bot. Garden Calcutta.

Lith. by H.C.Ghosal. Govt. School of Art Calcutta.

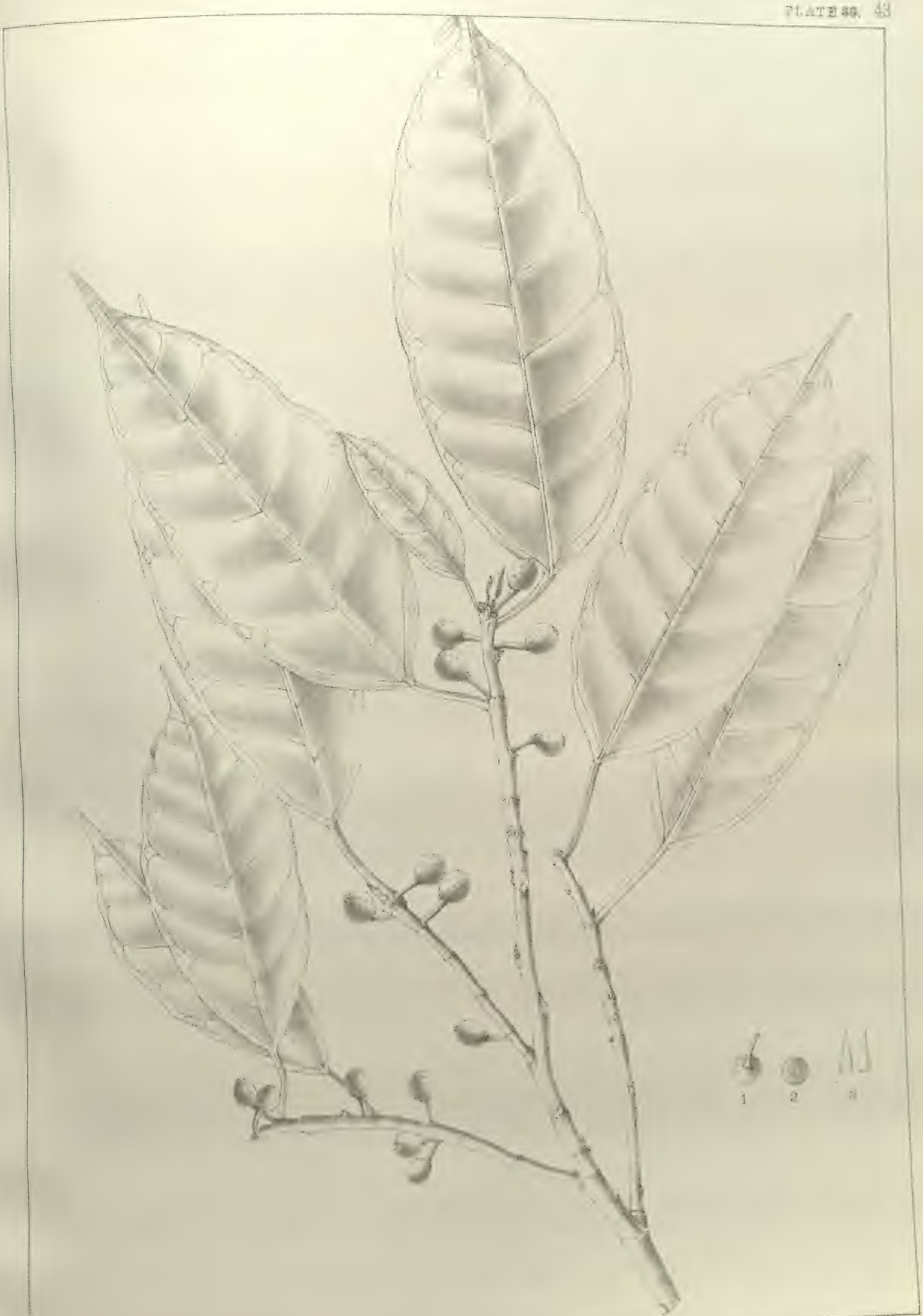
FICUS PROCERA, BL. VAR. CRASSIRAMEA.

PLATE ~~XXII~~ 42

G. C. Das del. Roy. Bot. Garden, Calcutta

Litho. by S. P. Mitra, Govt. School of Art Calcutta

FICUS HOOKERI, Miq.

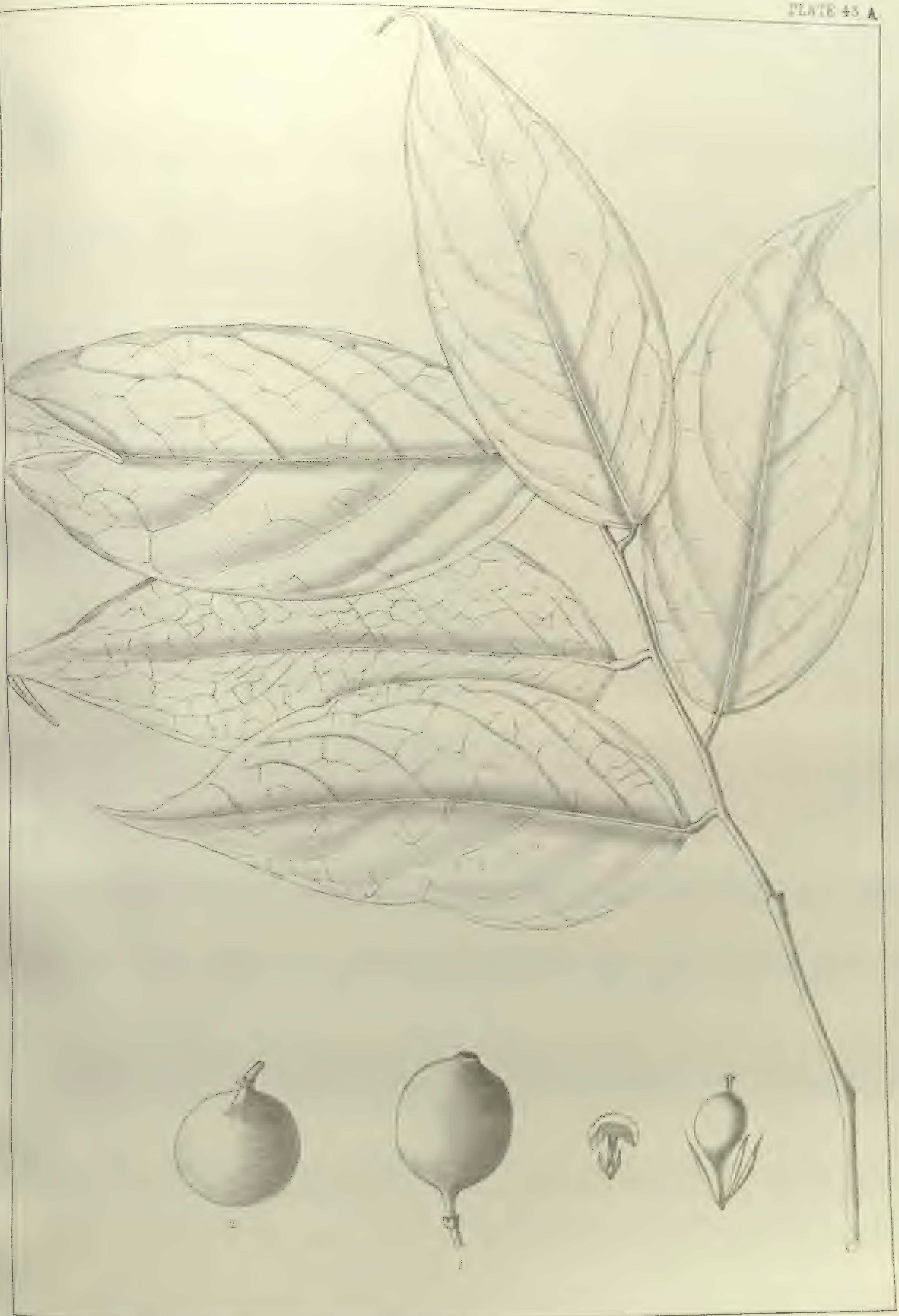


[illegible] Calcutta.

Lith. by B. K. Roy Govt. School of Art Calcutta.

FICUS GLABERRIMA, Blume.

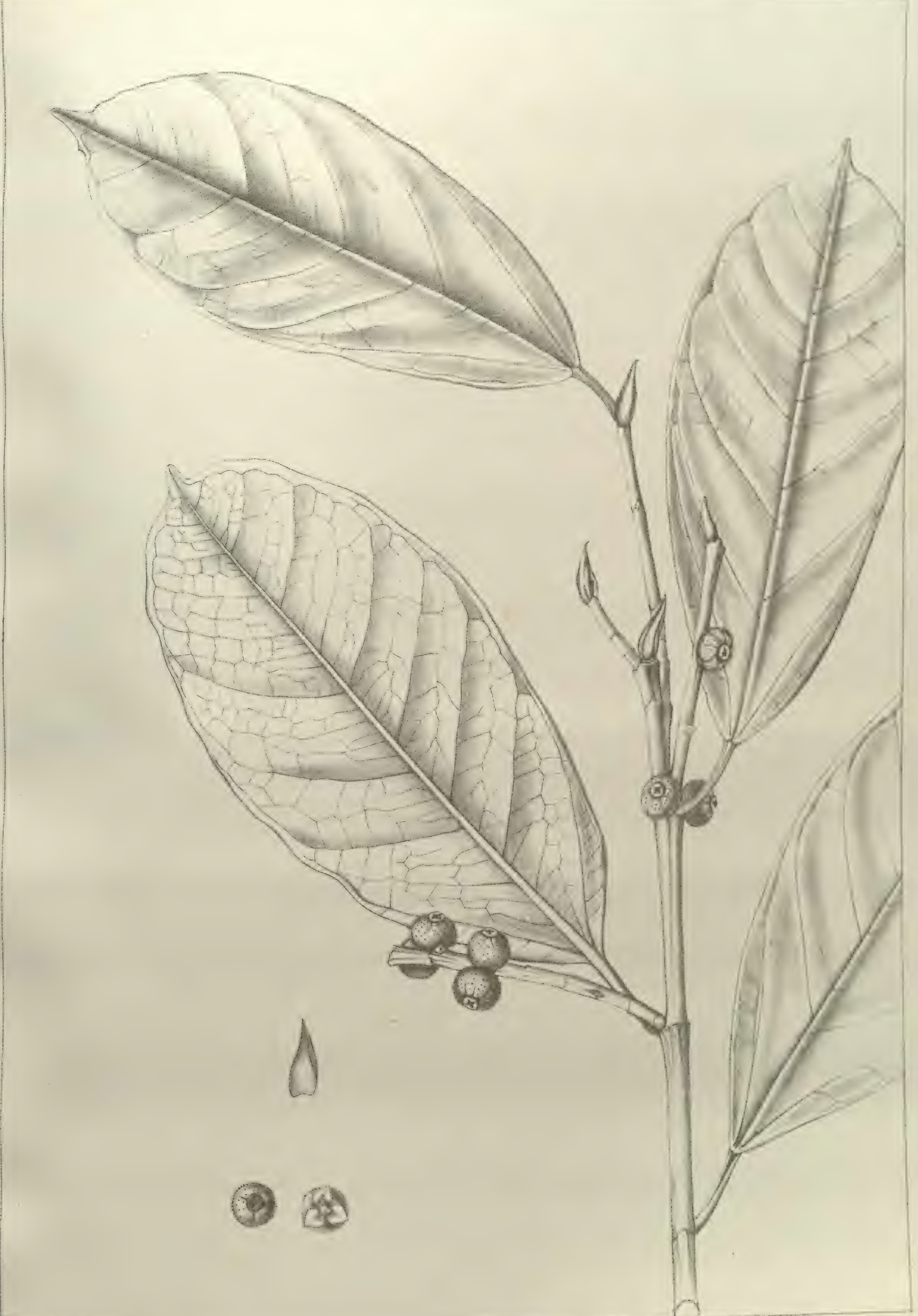
PLATE 43 A.



G. C. Das del. Bot. Garden Calcutta.

Lith. by S. K. Roy Govt. School of Art Calcutta.

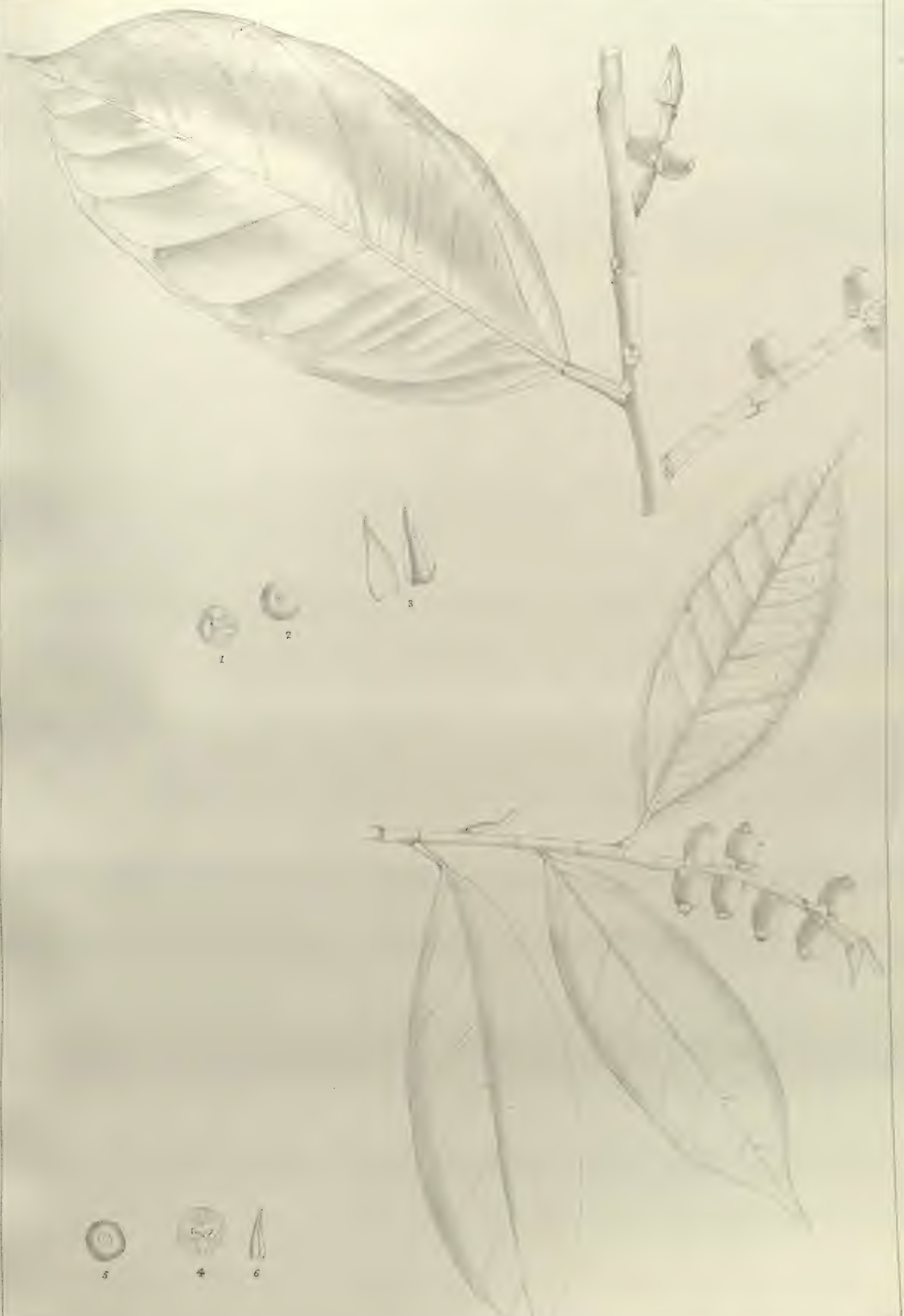
FICUS ROWELLIANA, King.



C. C. Das del. Bot. Garden, Calcutta

Lith: by H. L. Pal. Govt. School of Art Calcutta

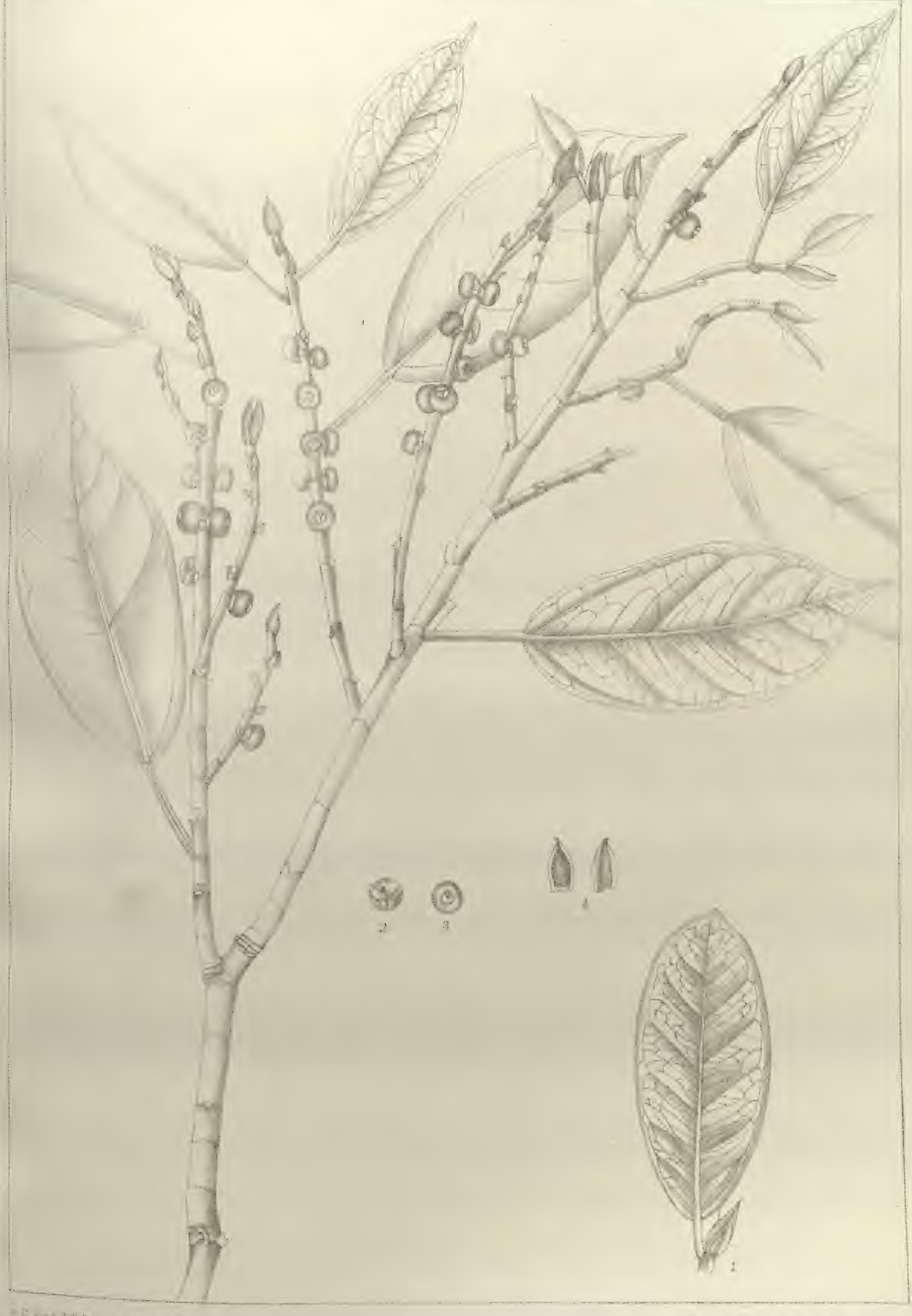
FICUS MICROSTOMA, ~~Blume~~ Wall.



D. C. Das del. Bot. Garden Calcutta.

Lith by D. Neogy Govt. School of Art Calcutta.

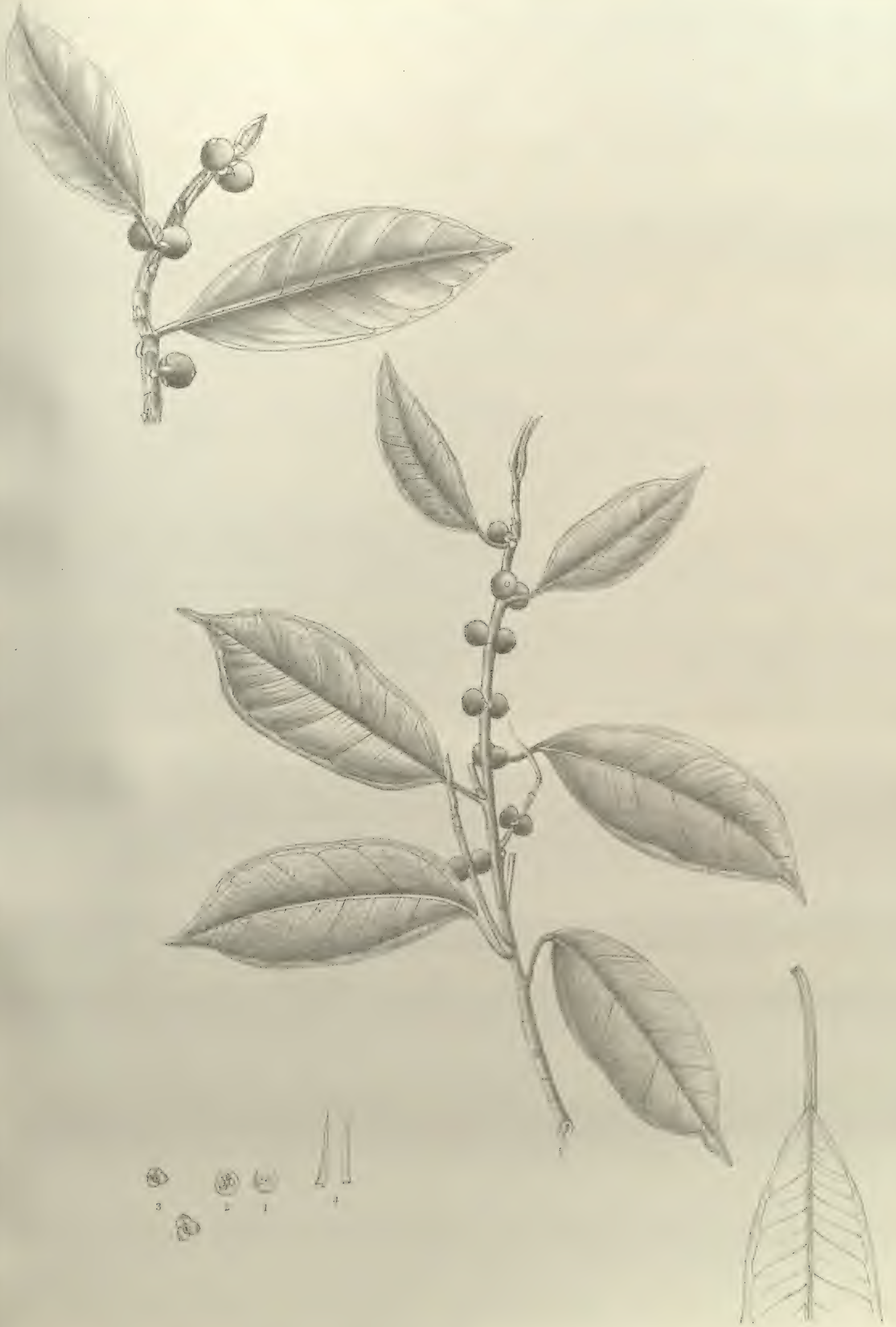
FICUS INDICA, Linn.



C. Das del. Bot. Garden Calcutta.

Lith. by D. Bagy Govt. School of Art Calcutta.

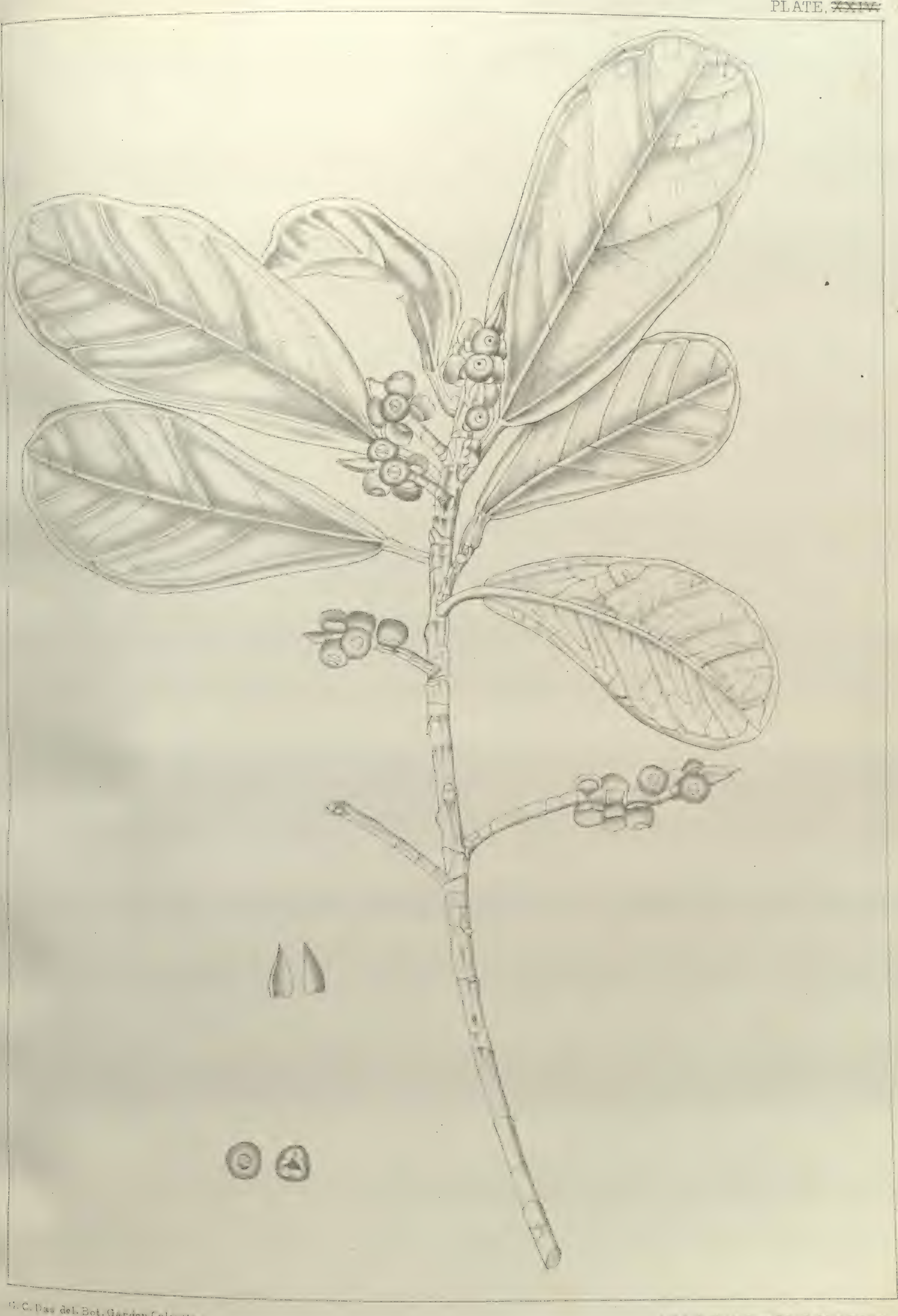
FICUS ACAMPTOPHYLLA, Miq.



G. C. Das del. Bot. Garden Calcutta.
Lith by R. N. Das Govt. School of Art Calcutta,
W. Newman & Co. Ld. Imp.

FICUS BINNENDYKII, Miq.

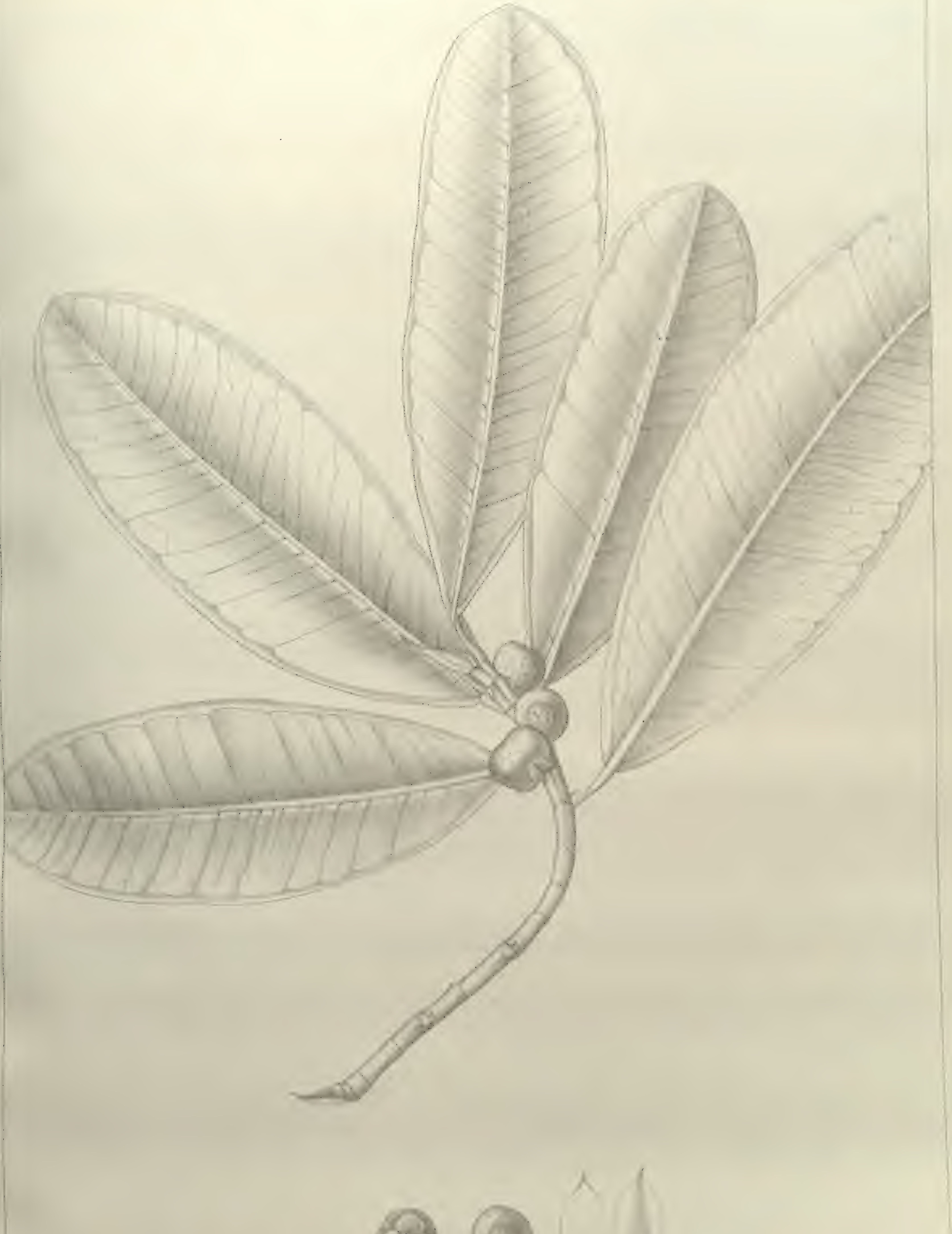
PLATE, ~~XXIV~~ 48



G. C. Das del. Bot. Garden Calcutta.

Lith. by P. Pleogy Govt. School of Art Calcutta.

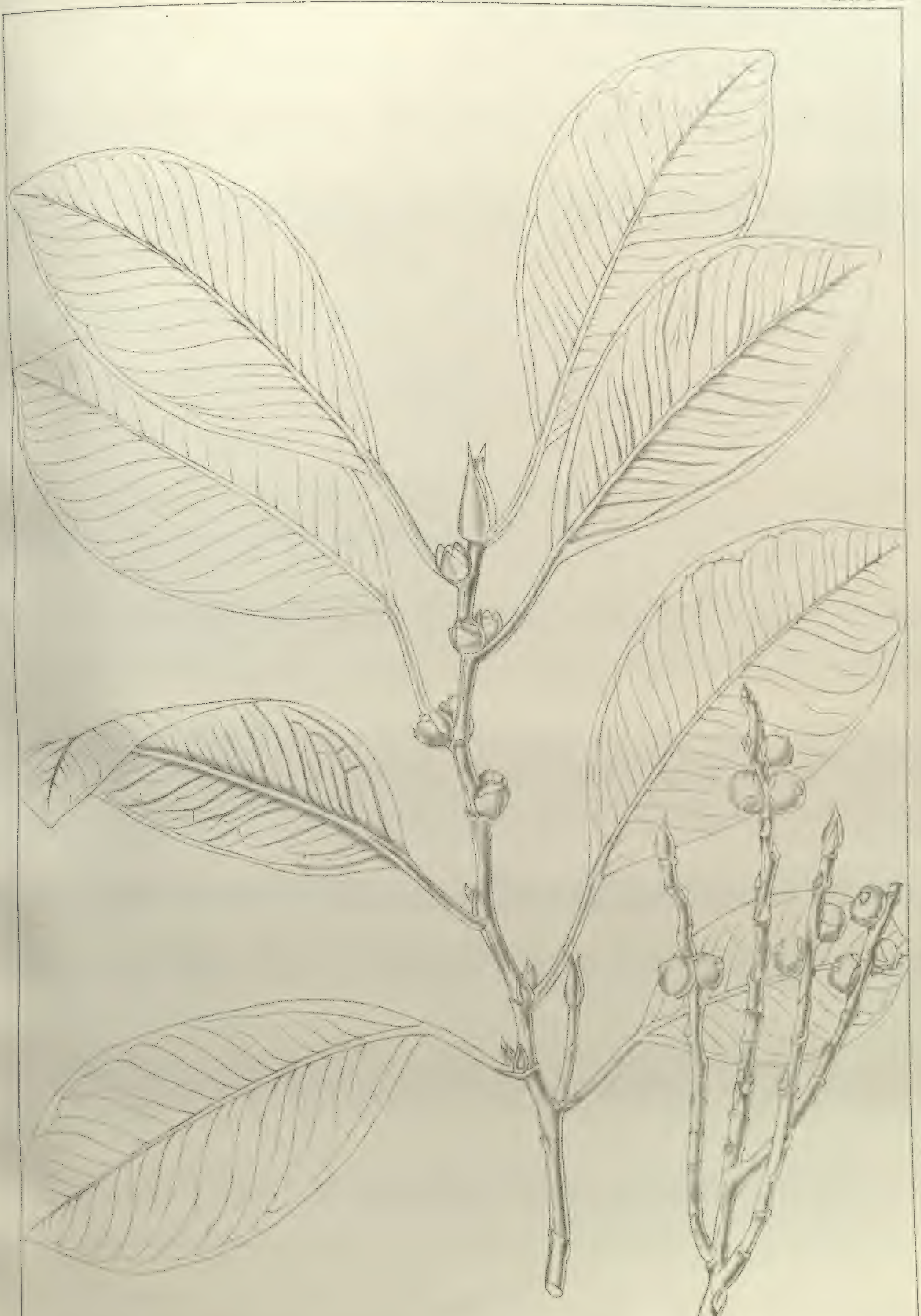
FICUS TRUNCATA, Miq.



G. C. Das del. Roy. Bot. Garden Calcutta.

Lith. by S. Banerji Govt. School of Art Calcutta.

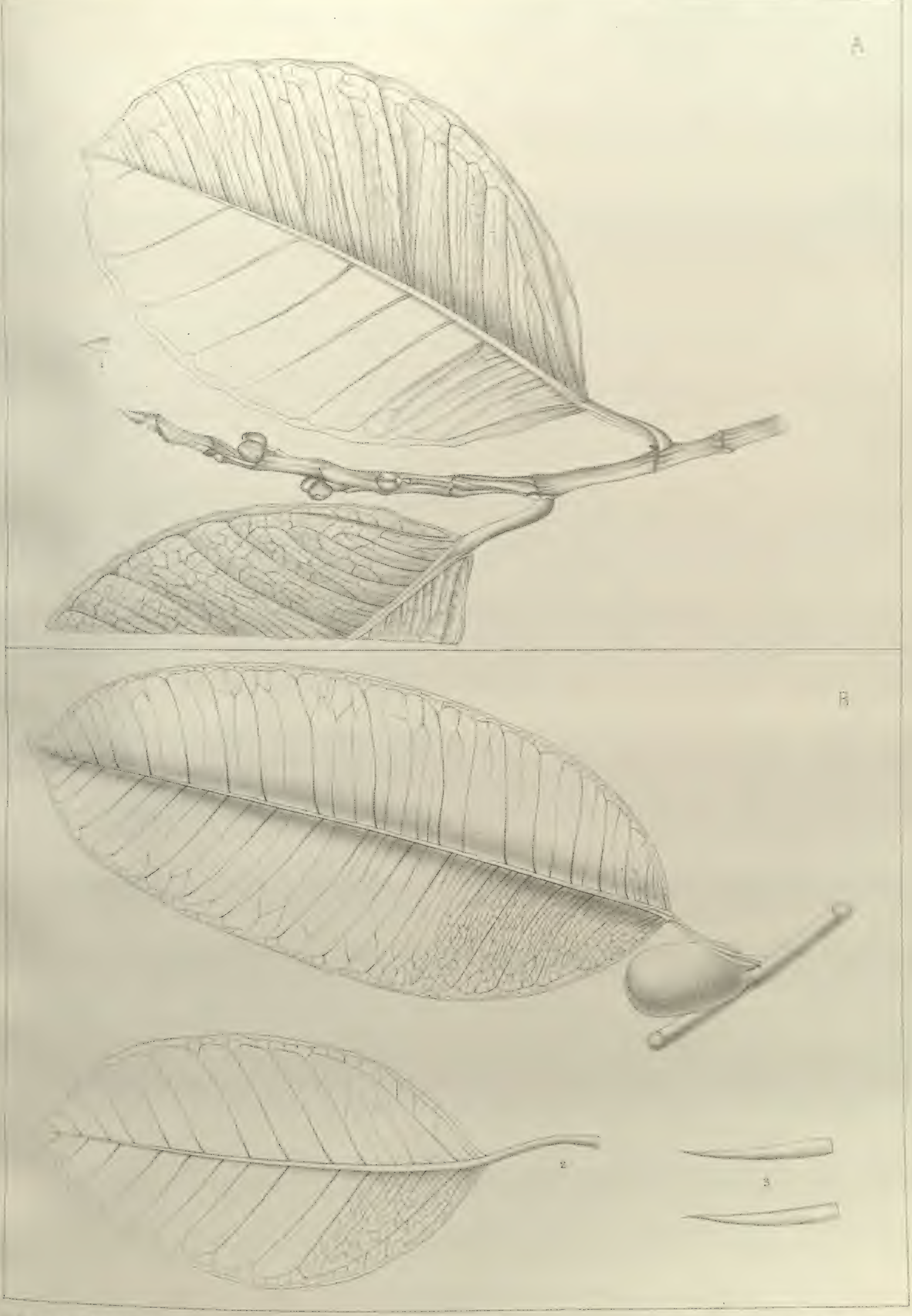
FICUS OBTUSIFOLIA, Roxb.



M. Smith del.

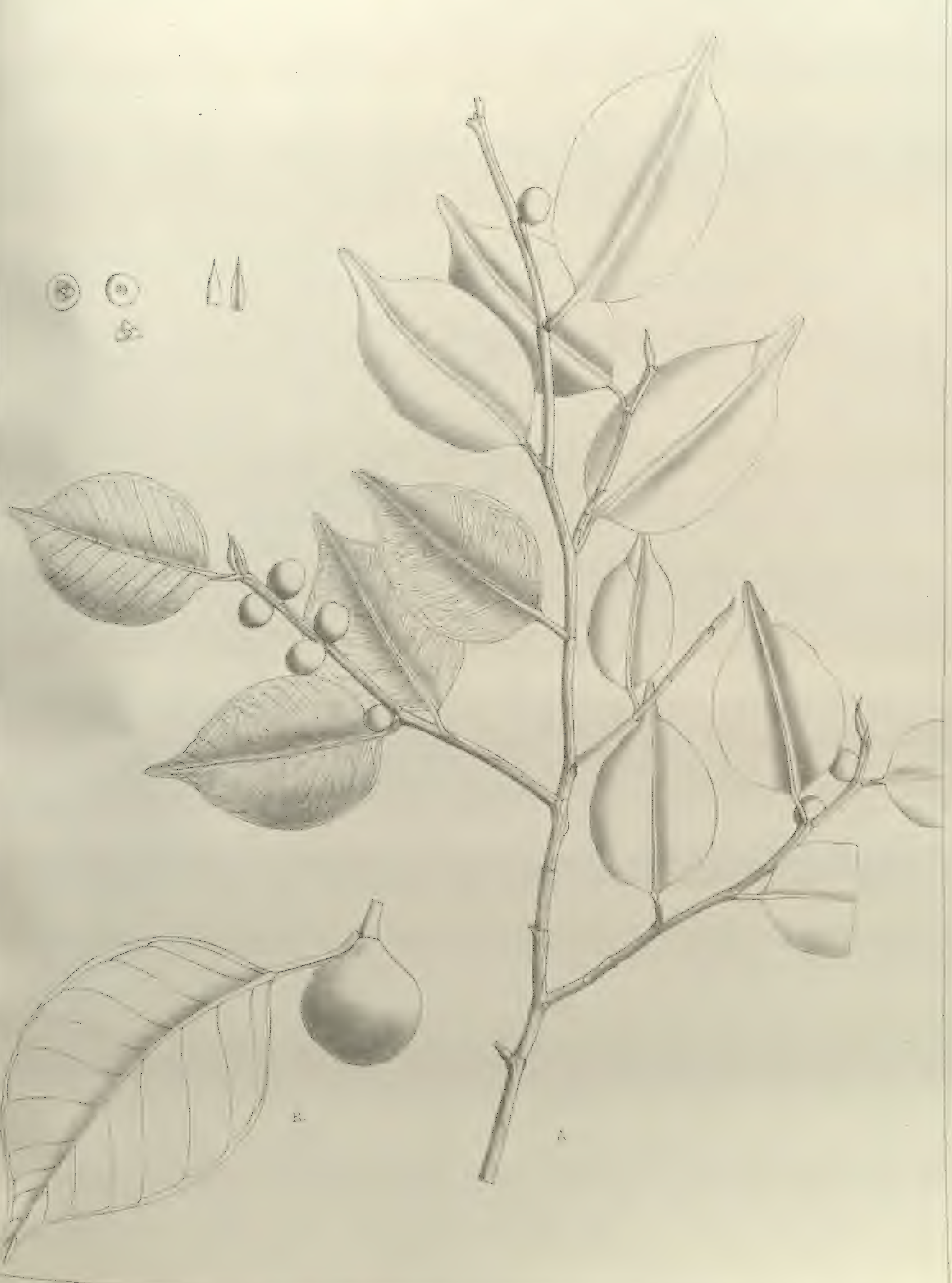
Lith: by K. D. Acheearjy Govt. School of Art, Calcutta.

FICUS CLUSIOIDES, Miq.



S. P. Das del. Bot. Garden Calcutta.
Lith. by B. C. Ghosal Govt. School of Art Calcutta.

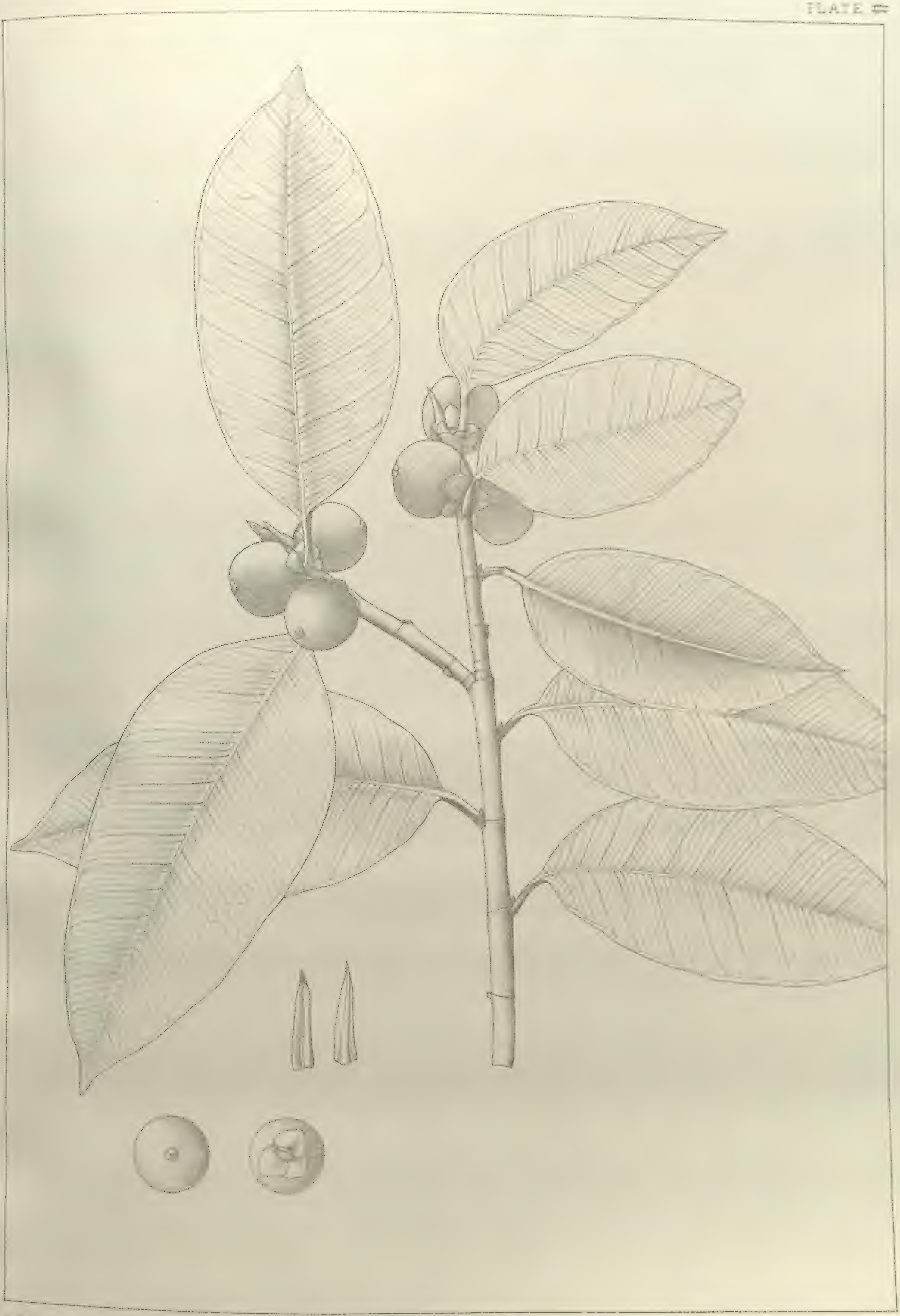
A. FICUS CALOPHYLLA, Bl.
B. " GARCINIAEFOLIA, Miq.



G. C. Das del. Bot. Garden Calcutta

Lith: by H. C. Dutt Govt. School of Art Calcutta.
W Newman & C^{o} L^{d} Imp.

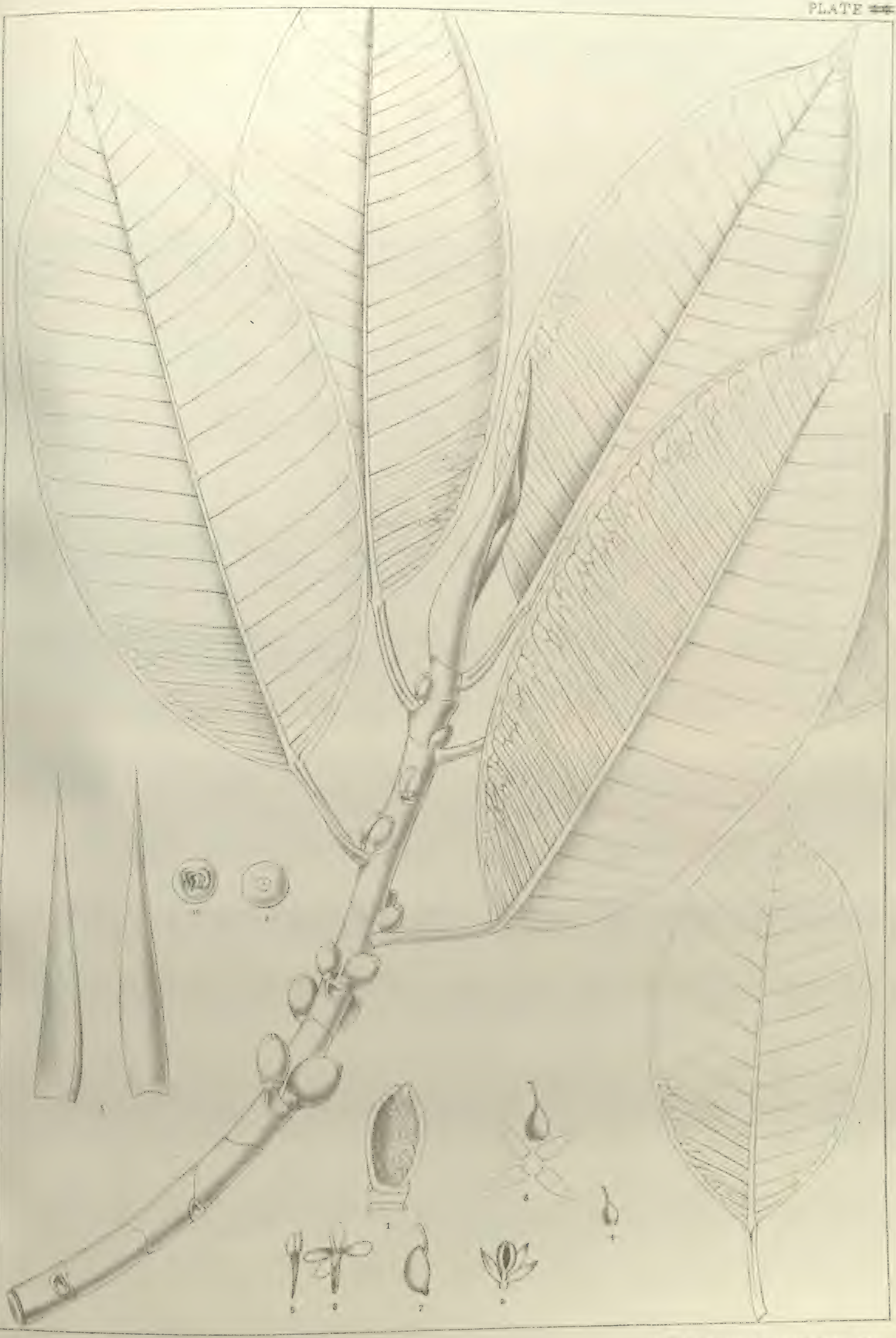
FICUS BENJAMINA Linn.
B. VAR. COMOSA.



S. C. Das del. Bot. Garden Calcutta.

Lith. by D. Hogg Govt. School of Art Calcutta.

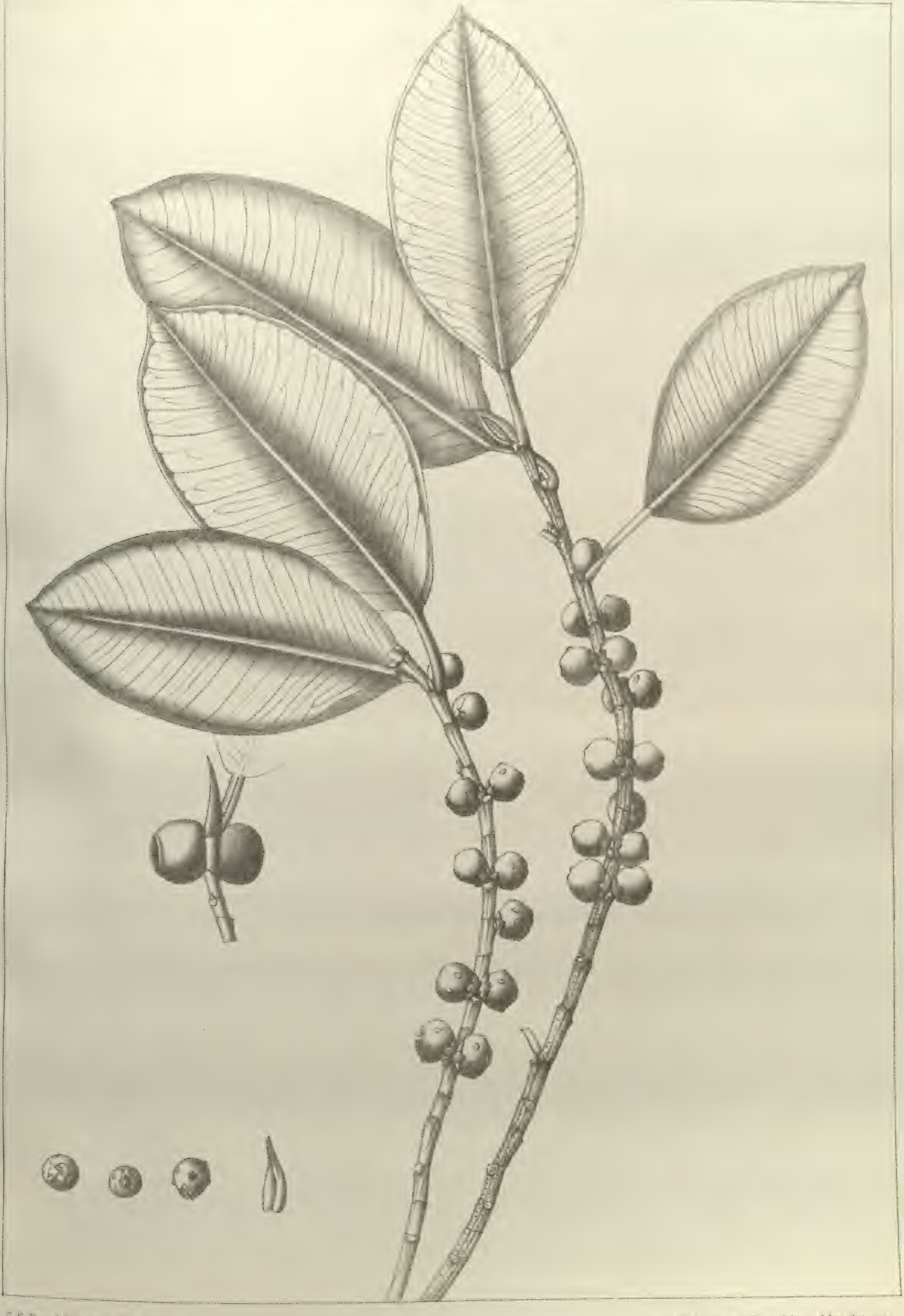
FICUS STRICTA, Miq.



G. C. Das del. Bot. Garden Calcutta.

Lith. by H.C. Ghosal. Govt. School of Art, Calcutta.

FICUS ELASTICA, Roxb

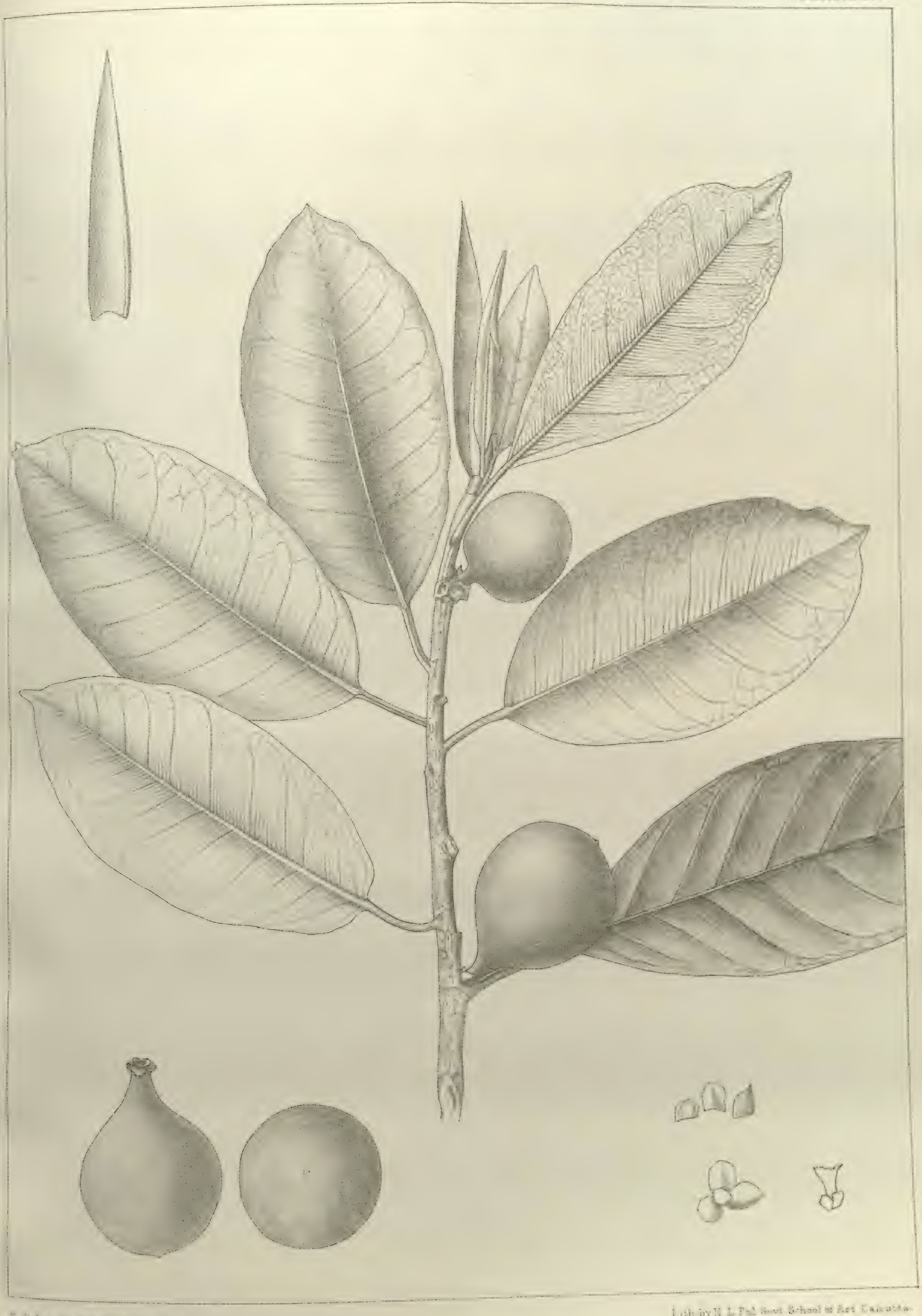


G. C. Das del. Bot. Garden Calcutta.

Lith. by S. Banarji Govt School of Art Calcutta.

FICUS TRIMENII, King.

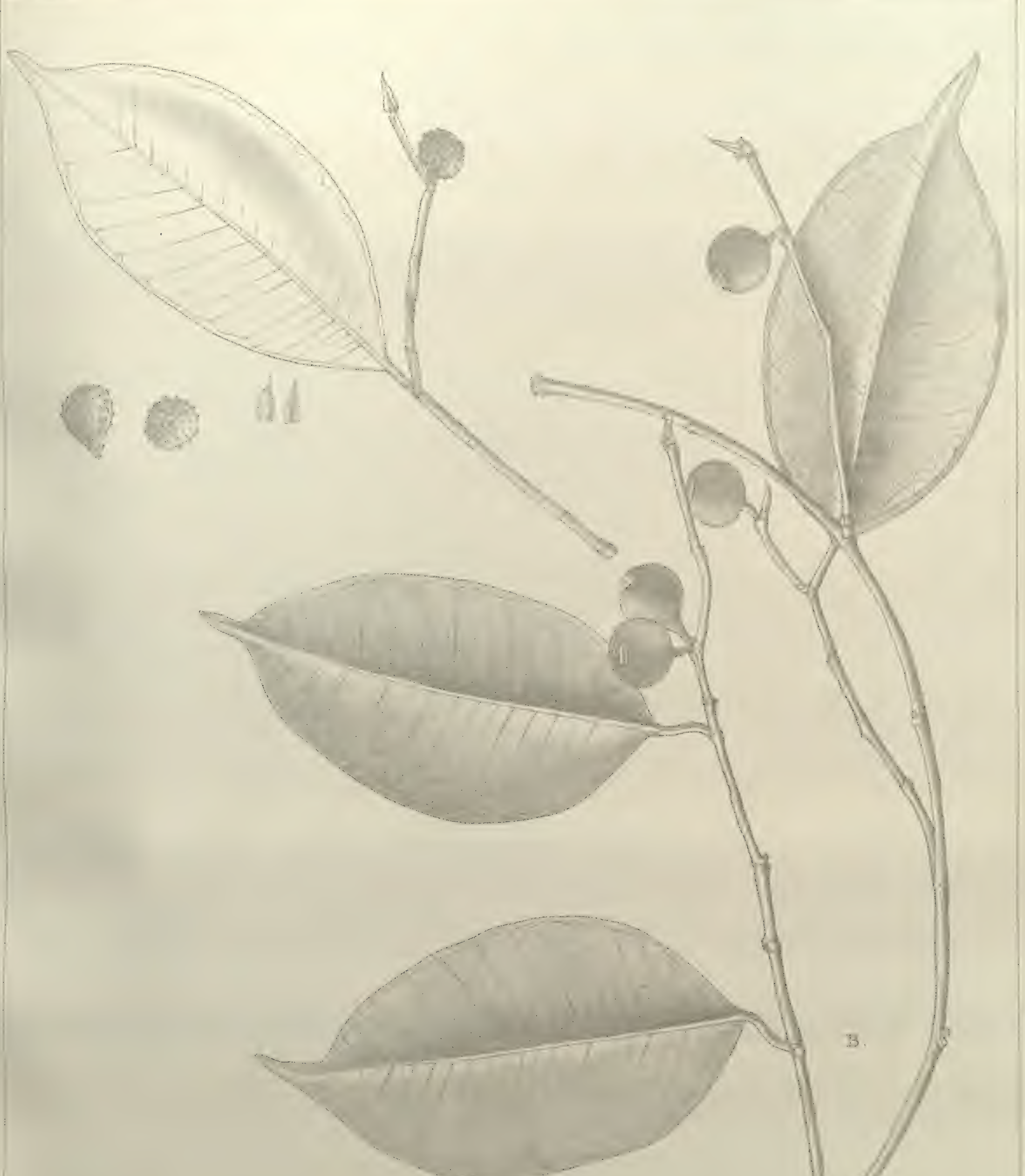
PLATE. ~~CV.~~ 56



G. C. Das del. Bot. Garden Calcutta.

Lith. by H. L. Pal Govt. School of Art Calcutta.

FICUS DUBIA. Wall.



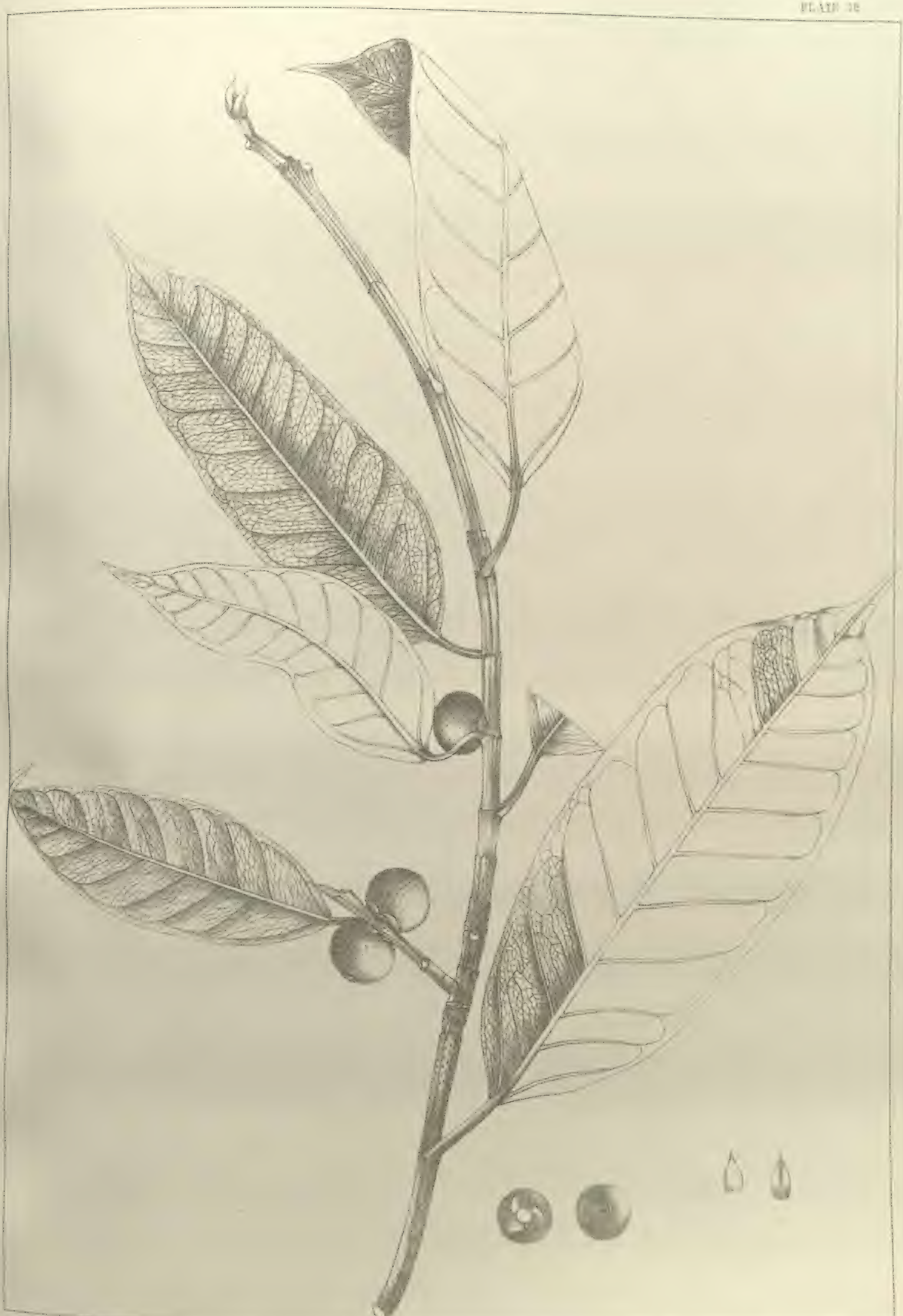
[illegible] del. Bot. Garden, Calcutta.

Lith. by H. L. Pal Govt. School of Art Calcutta.

~~FICUS NUDA Miq.~~

~~[illegible] MACROCARPA, Miq.~~

FICUS KURZII. King.

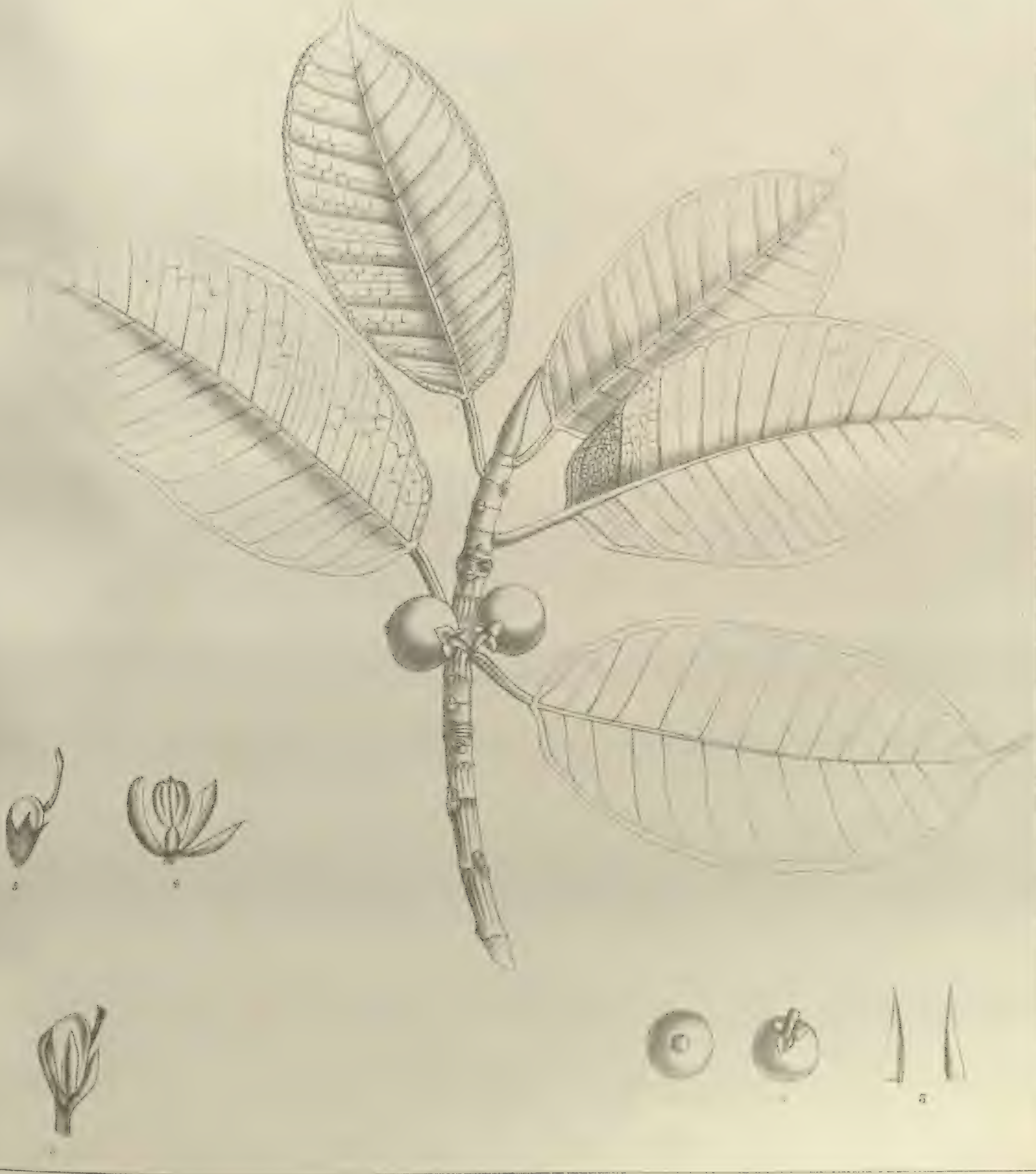


G. C. Das del. Bot. Garden Calcutta

Lith. by J. C. Chuckerbutty, Student School of Art.

FICUS RHODODENDRIFOLIA, Miq.

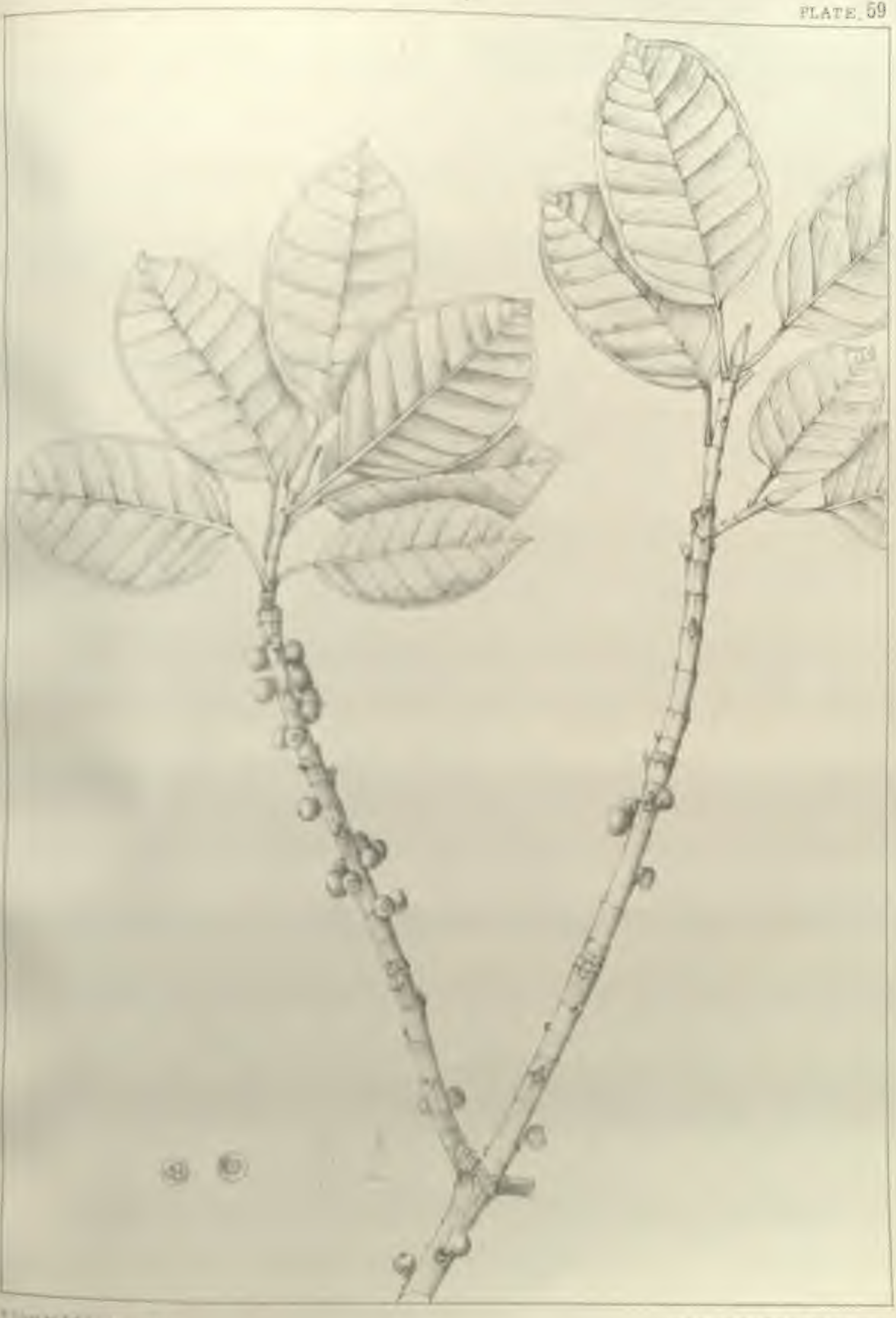
PLATE 58 A



G. C. Dass del. Bot. Garden Calcutta.

Lith. by H. C. Ghosal Govt. School of Art Calcutta.

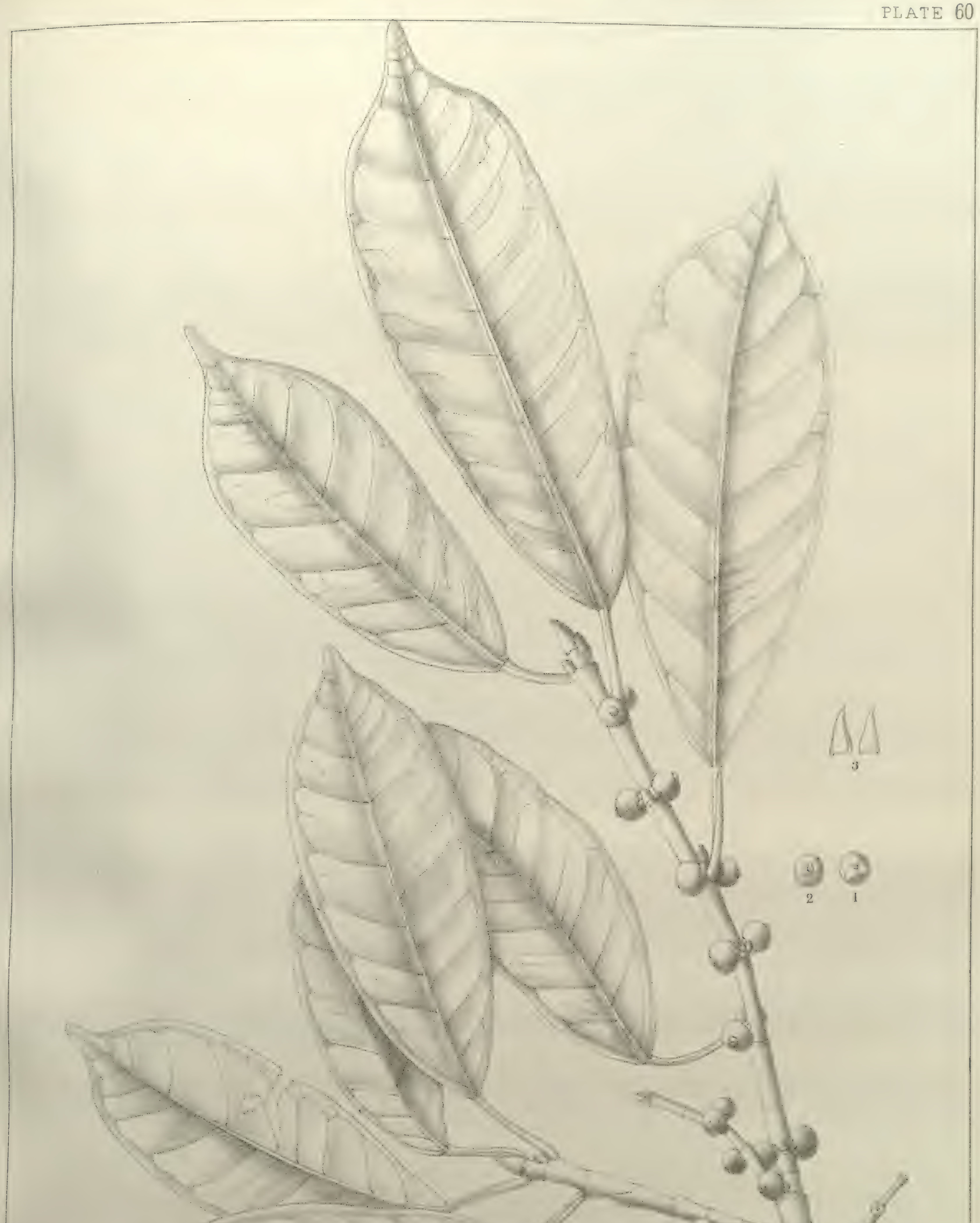
FICUS CAUDICULATA, TRIMEN



[illegible]

[illegible]

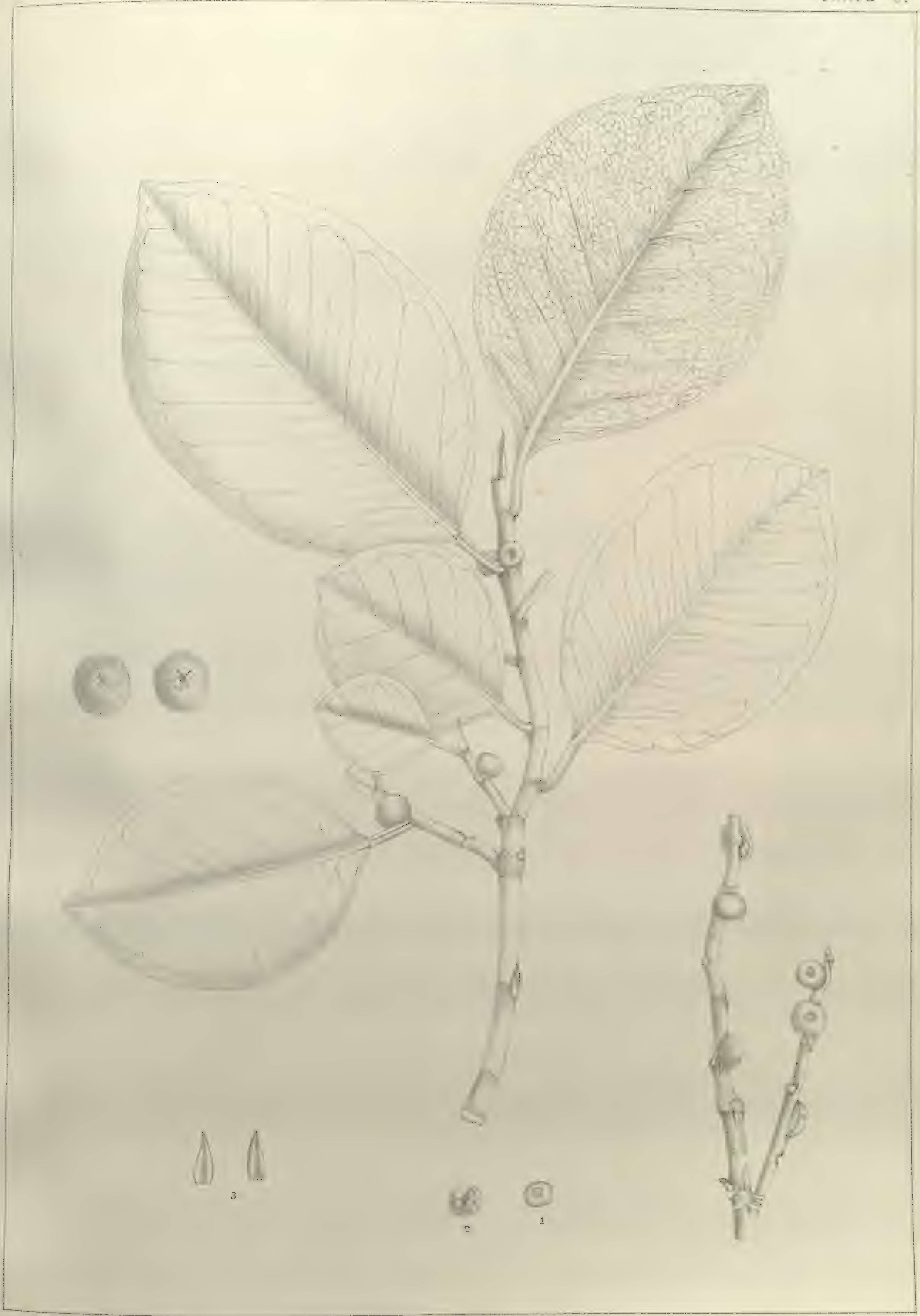
FICUS PISOCARPA, Blume.



G. C. Das del. Bot. Garden Calcutta.
Lith. by S. Banerjee Govt. School of Art Calcutta
W. Newman & Co Ld. Imp

FICUS GLABELLA, Blume.

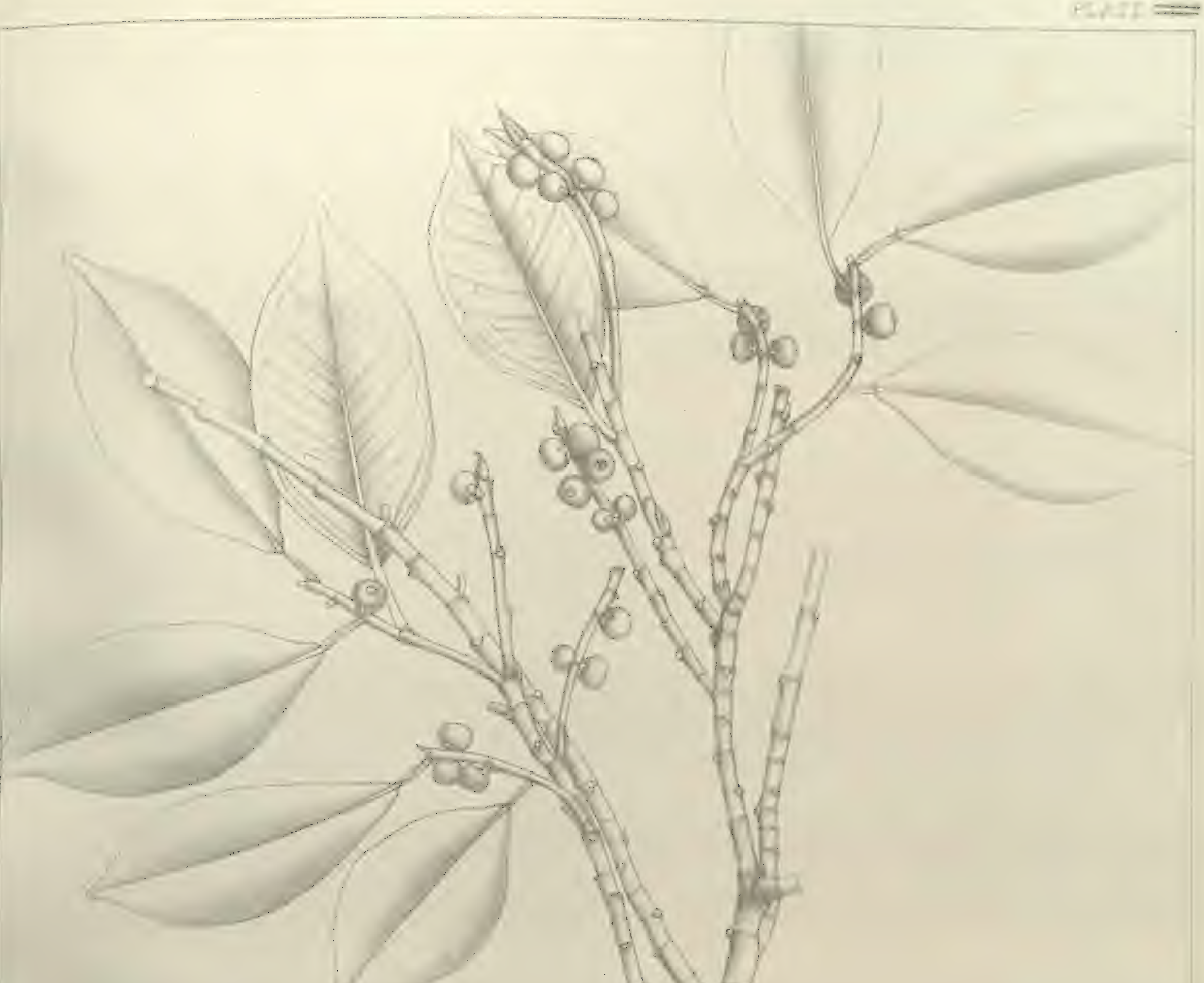
PLATE 61



G. C. Das del. Bot. Garden Calcutta.

Lith. by D. Neogy Govt. School of Art Calcutta.
W. Newman & Co. Ld. Imp.

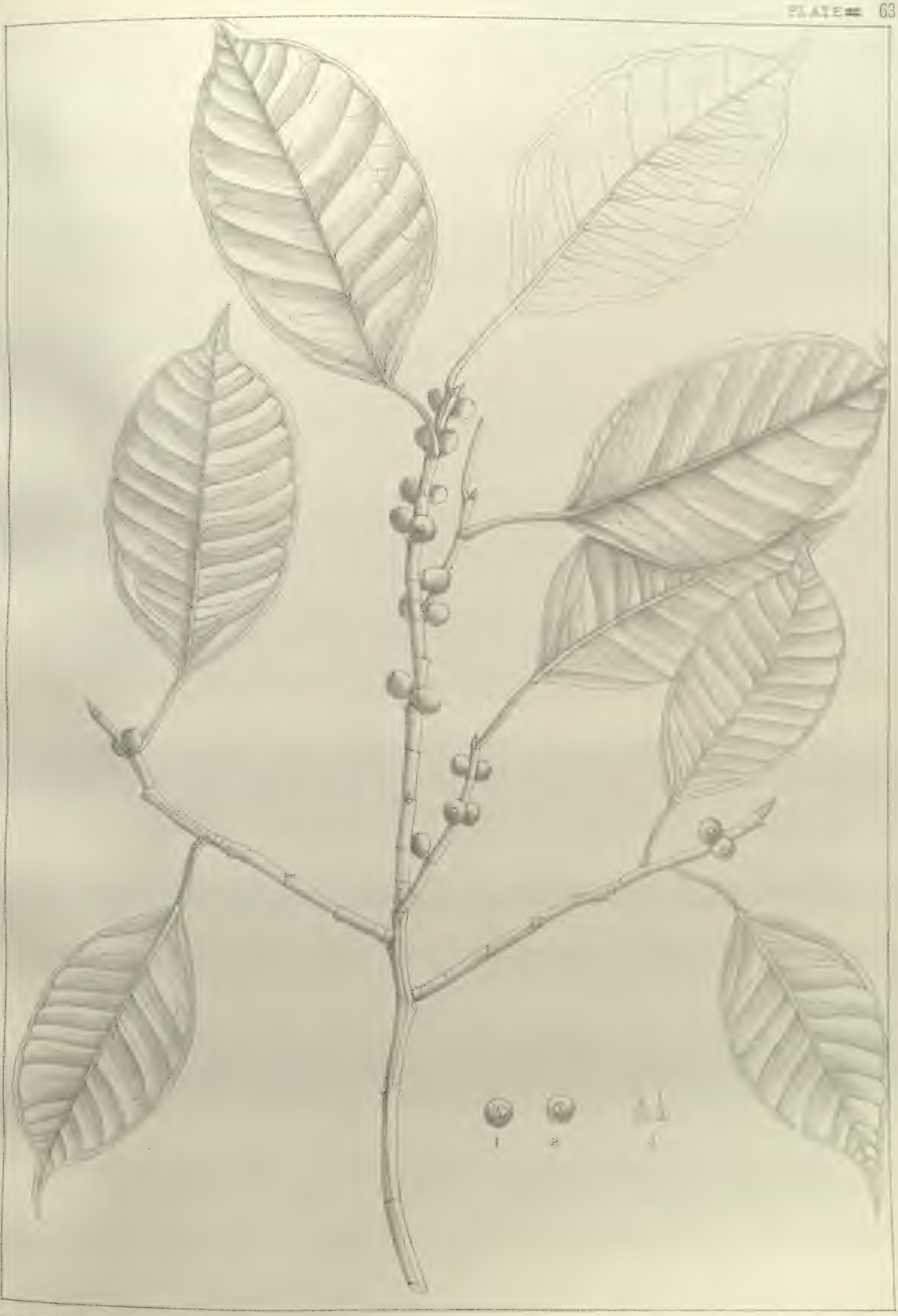
FICUS RETUSA, Linn.



[illegible] Das del., Bot. Gar. den Calcutta.

Lith. by H. L. Pal Govt. [illegible] Calcutta.

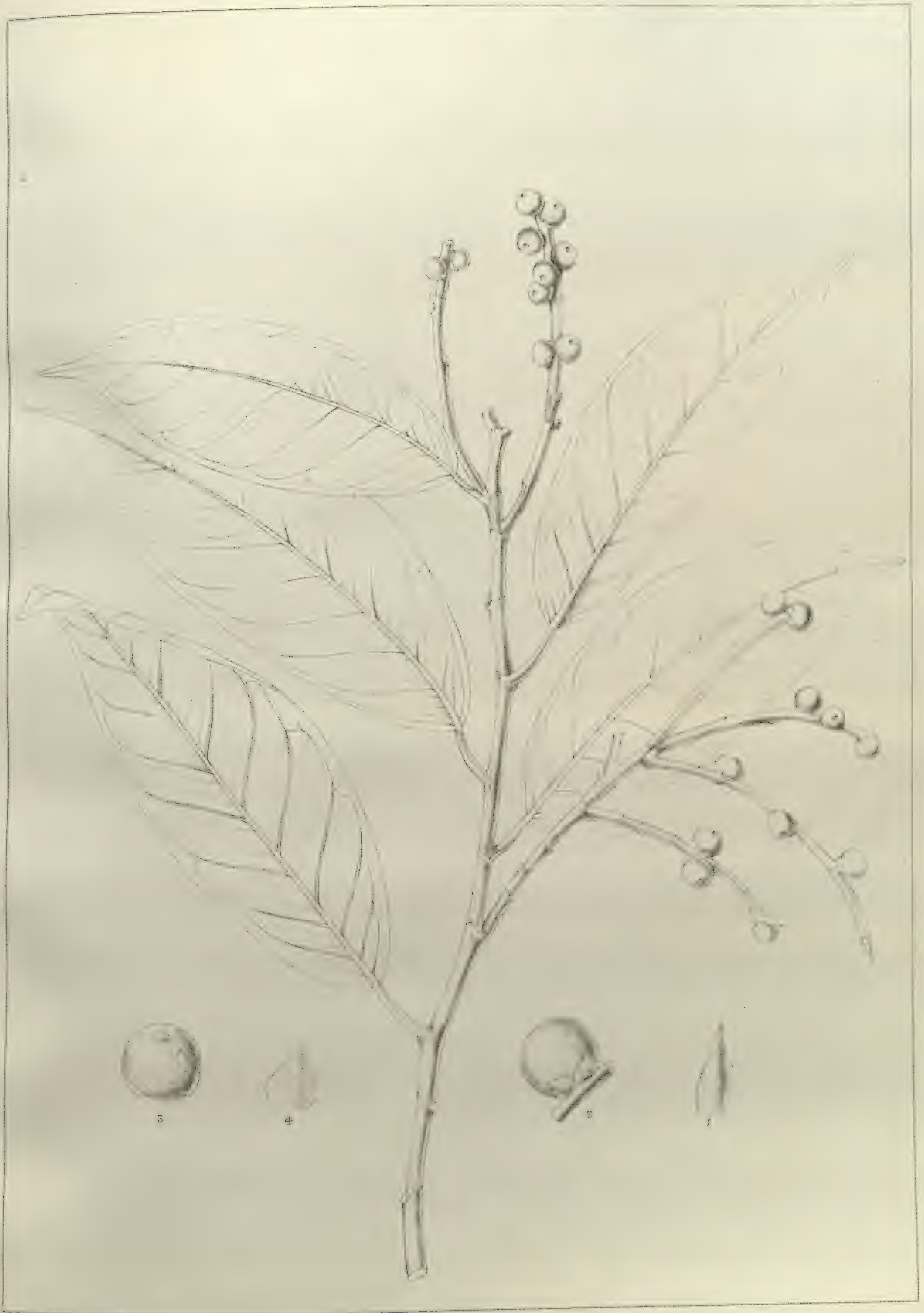
FICUS RETUSA, Linn. Var. nitida.



G. C. Das del. Roy. Bot. Gard. Calcutta.

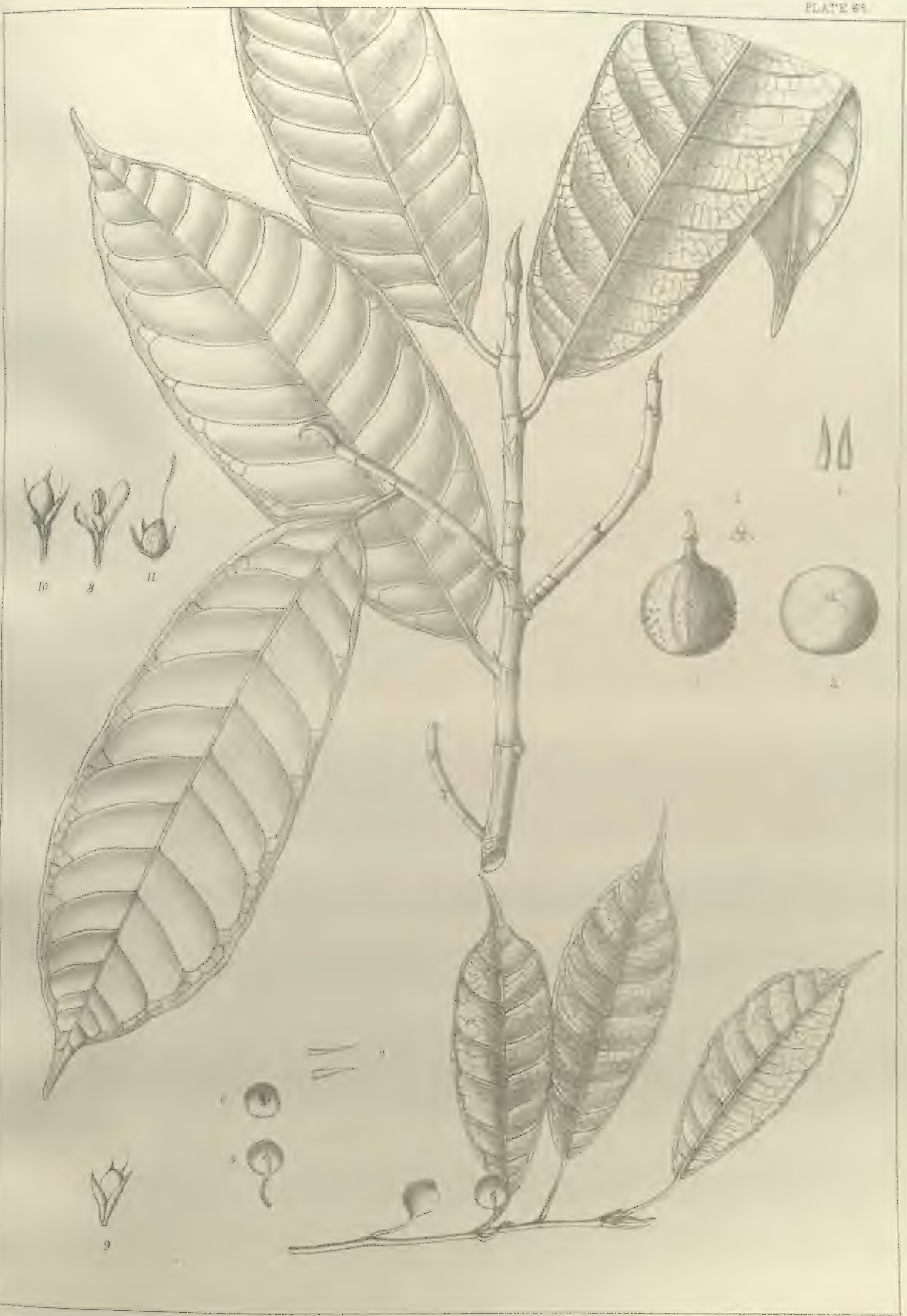
Lith. by S. Banerjee Govt. School of Art Calcutta.

FICUS TALBOTI, King.



[illegible] Lith. by D. B. Neogy Govt. School of Art Calcutta

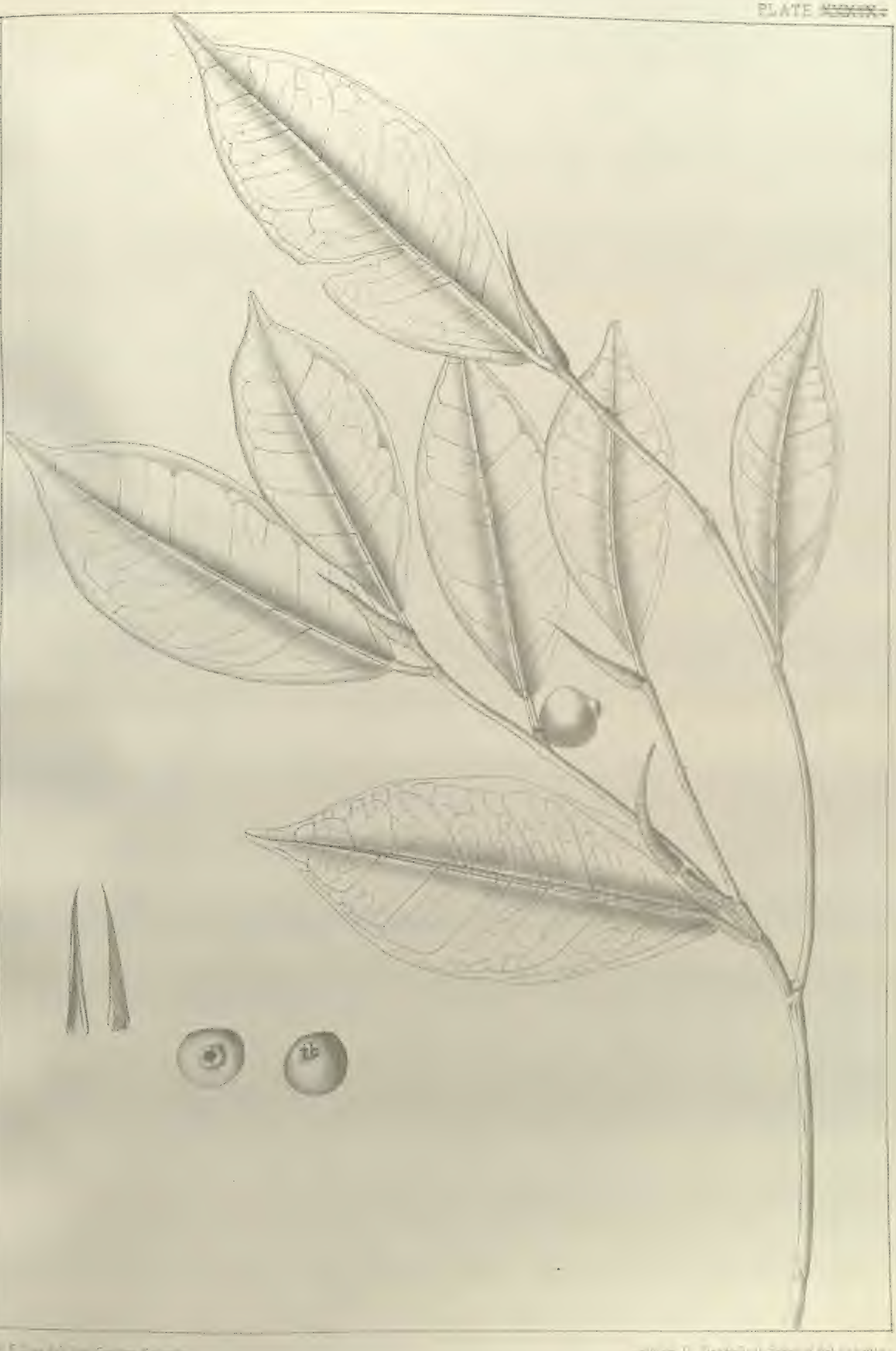
FICUS MACLELLANDI, King.



G C Das del. Bot. Garden Calcutta.
Lith by B. Banerji Govt. School of Art Calcutta.

FICUS NERVOSA, Heyne.

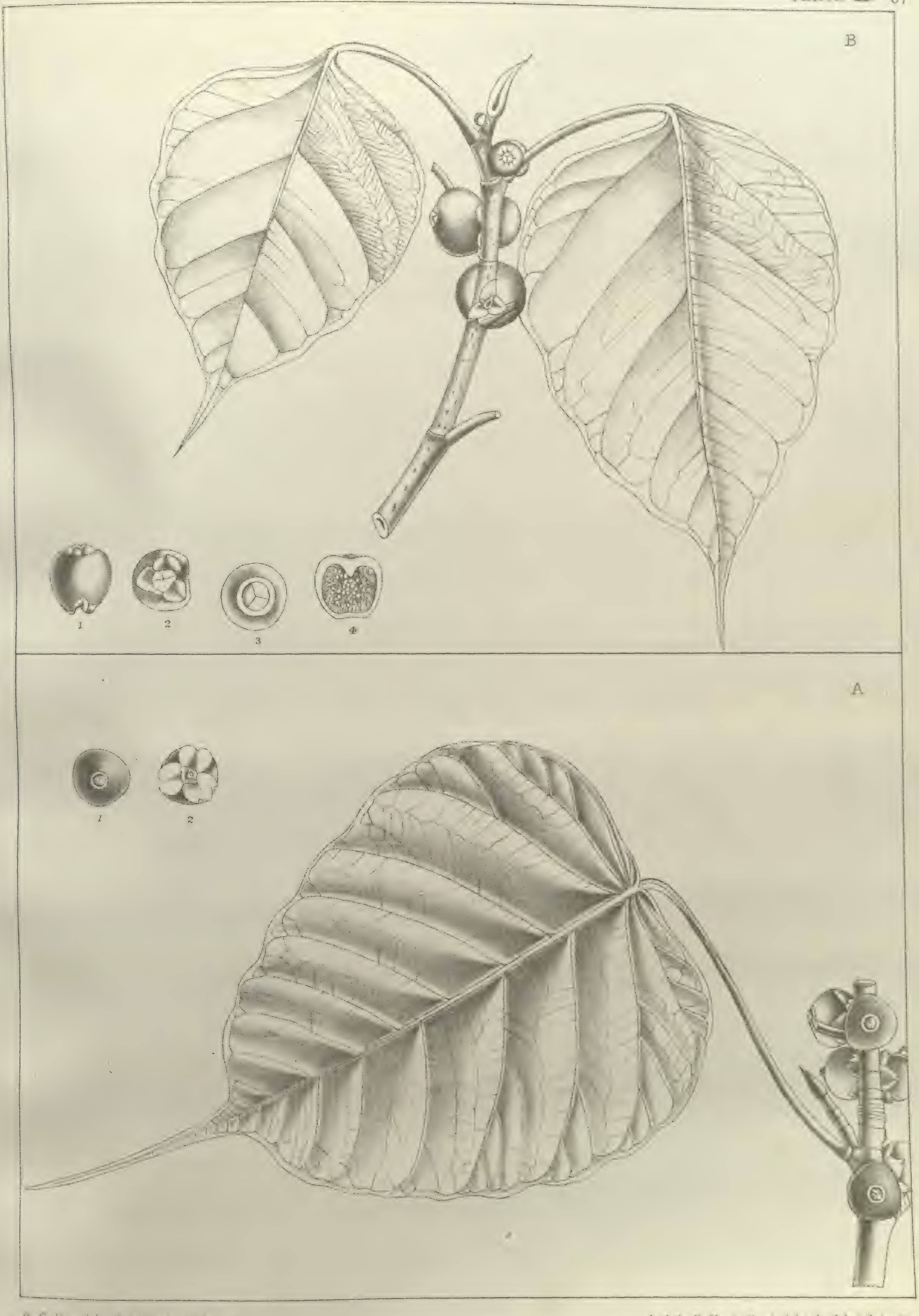
PLATE [illegible] 66



A. F. Das del. Bot. Garden Calcutta.

Lith. by D. Dasgupta School of Art Calcutta.

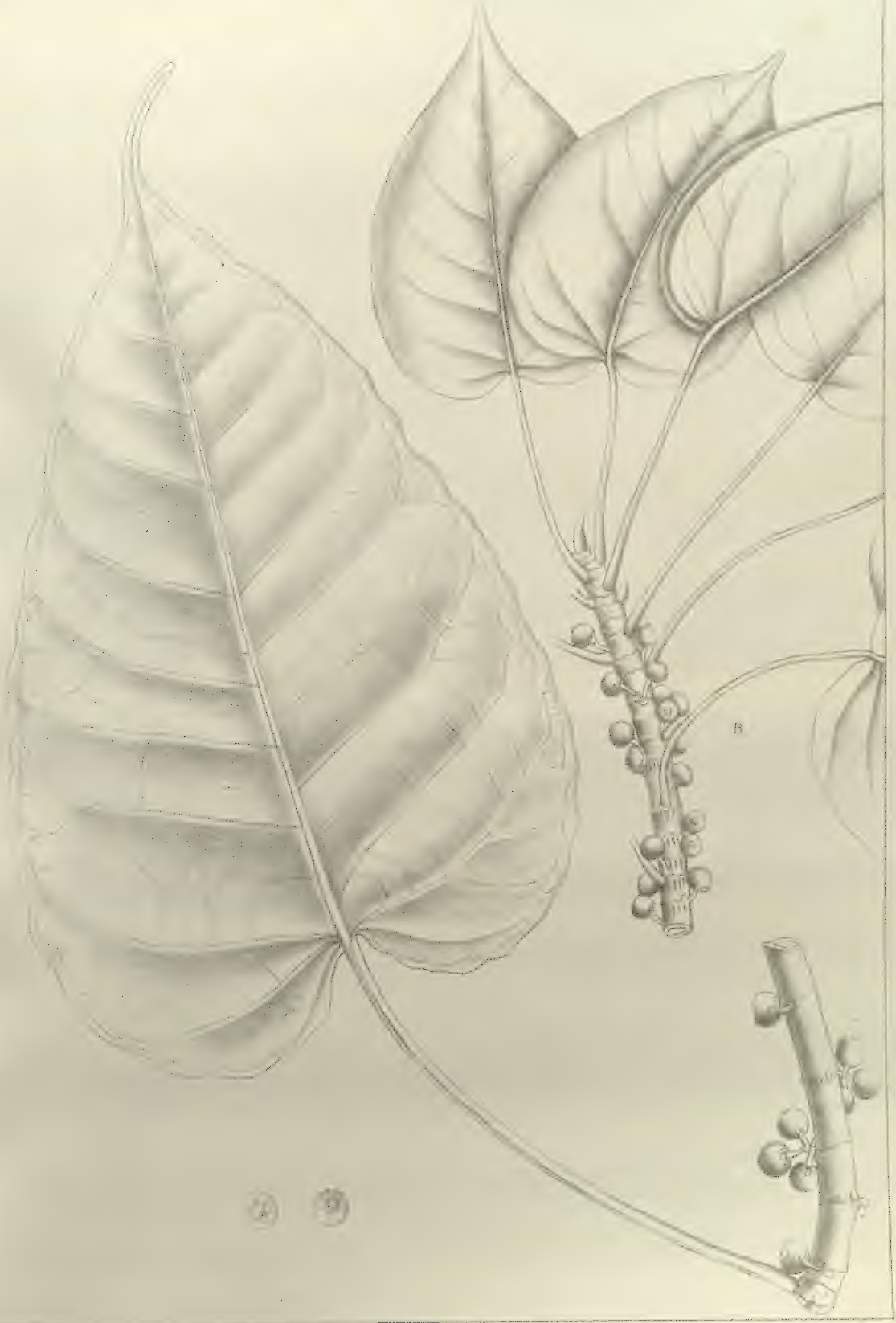
FICUS PUBINERVIS Blume



G. C. Das del. Bot. Garden, Calcutta.

Lith: by D. Neogy Govt. School of Art Calcutta.
W. Newman & Co. Lith. Imp.

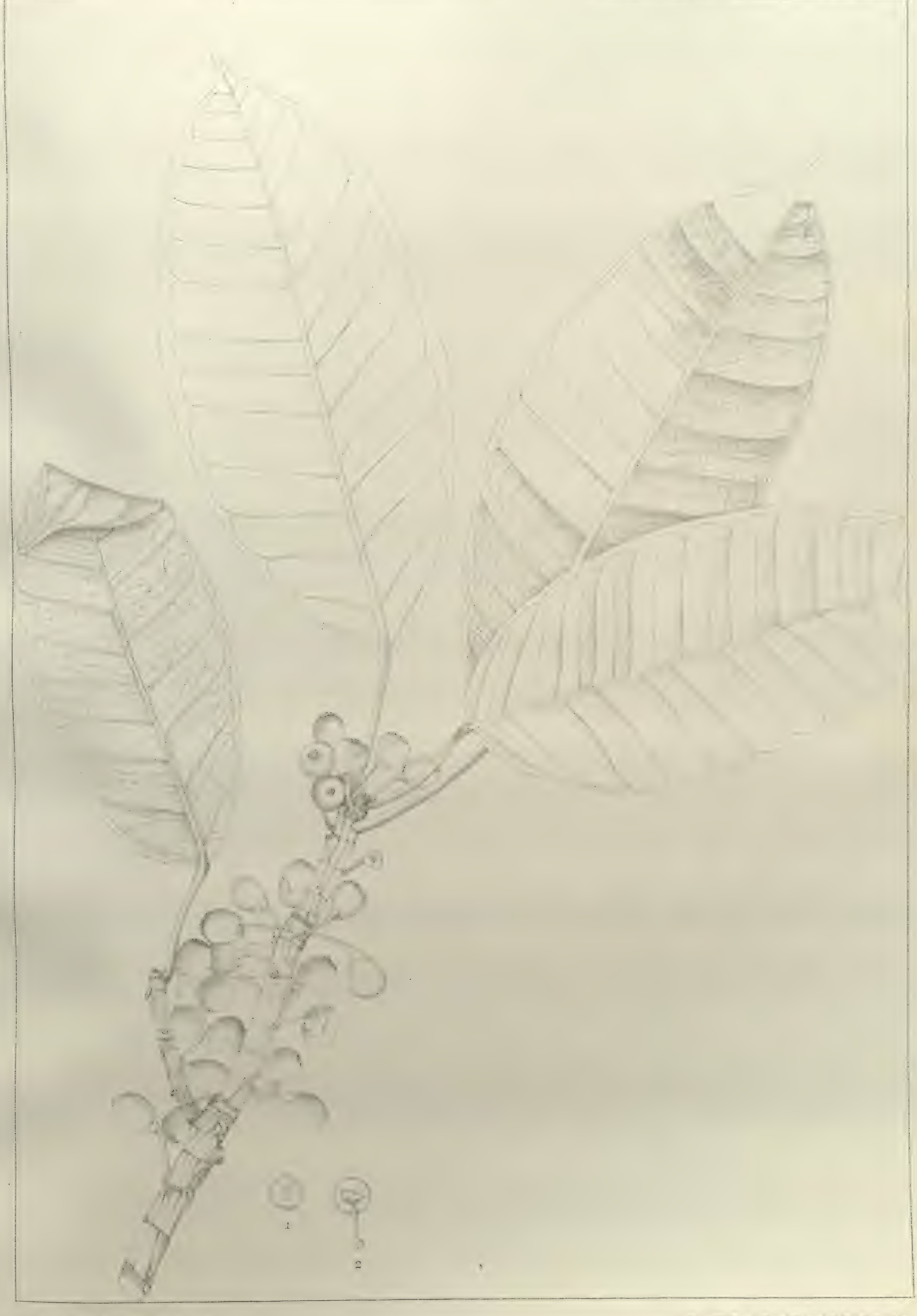
A. FICUS RELIGIOSA, Linn.
B " RUMPHII, Blume.



C. C. Das del. Bot. Garden Calcutta

Lith by H. L. Pal Govt. School of Art Calcutta

FICUS ARNOTTIANA, Miq.
B. VAR. COURTALLINSIS.



G. C. Das del. Bot. Garden Calcutta.

Lith: by D. Neogy Govt. School of Art Calcutta

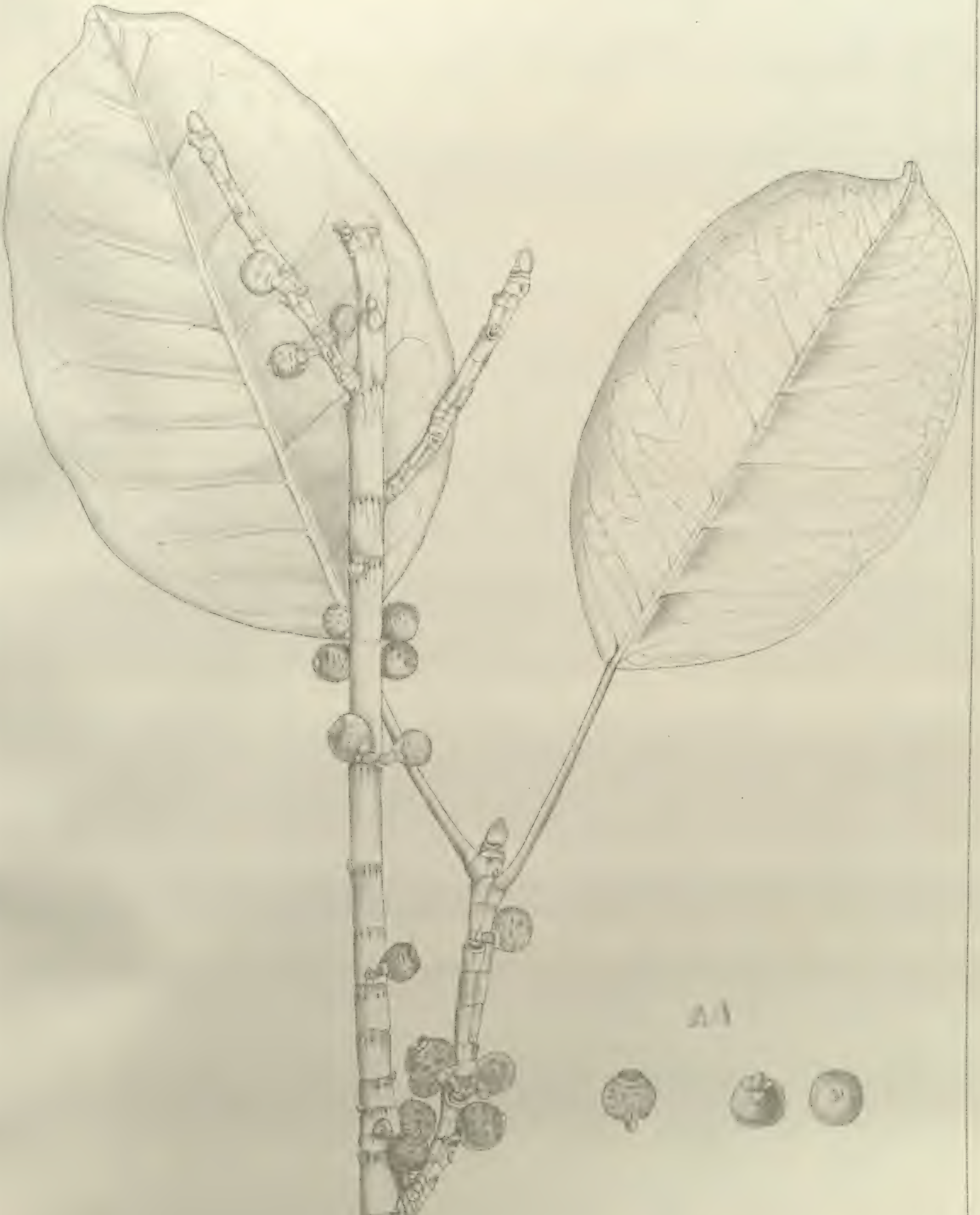
W. Newman & Co. Ld. Imp.

FICUS MOONIANA, King.

G. C. Das del. Bot. Garden Calcutta.

Lith: by R. N. Das Govt. School of Art Calcutta.
W. Newman & C^o. L^d. Imp.

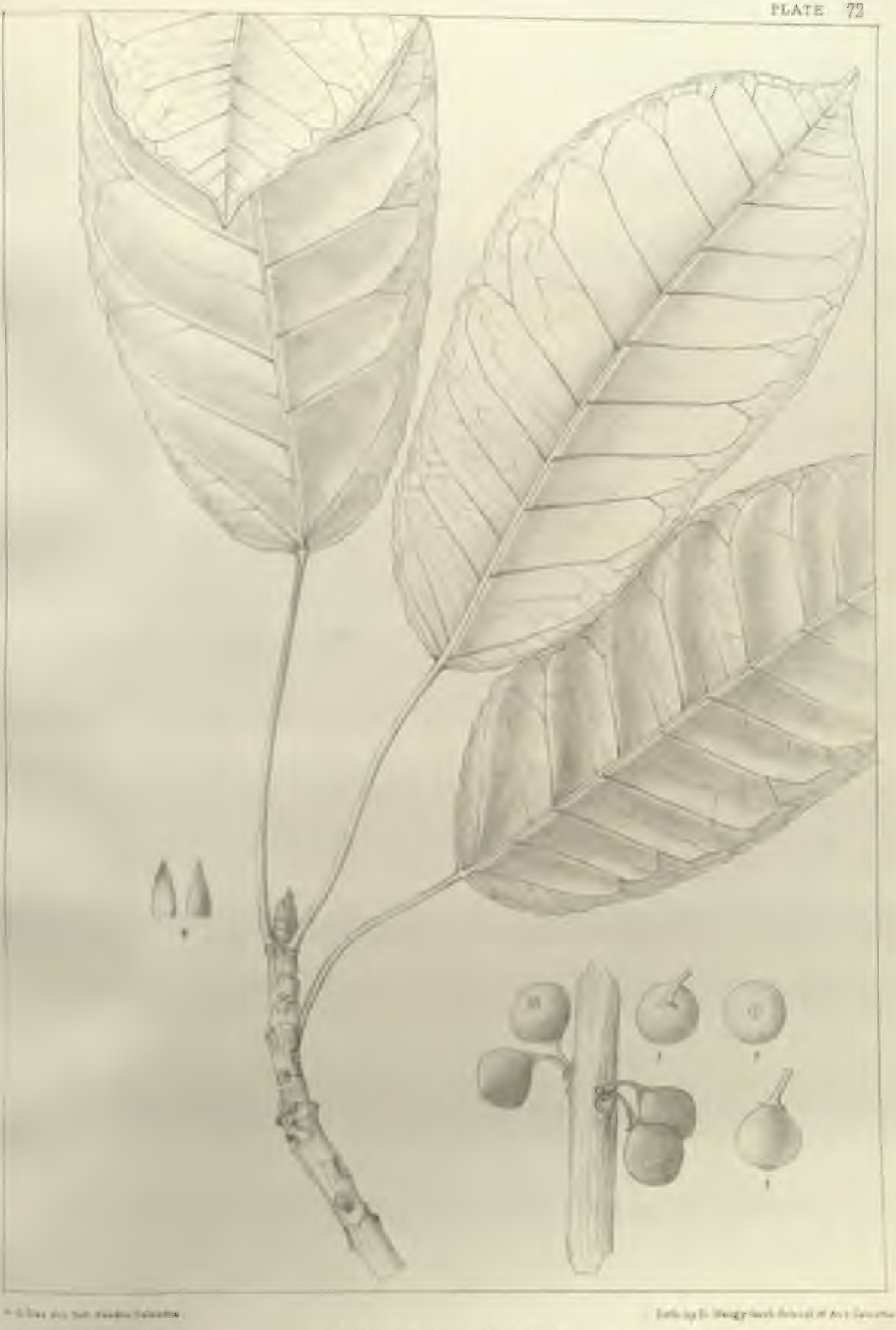
FICUS TJAKELA, Burm.



G. C. Das del. Roy. Garden Calcutta.

Lith. by D. Nandy Asst. School of Art Calcutta.

FICUS INSIGNIS, Kurz.

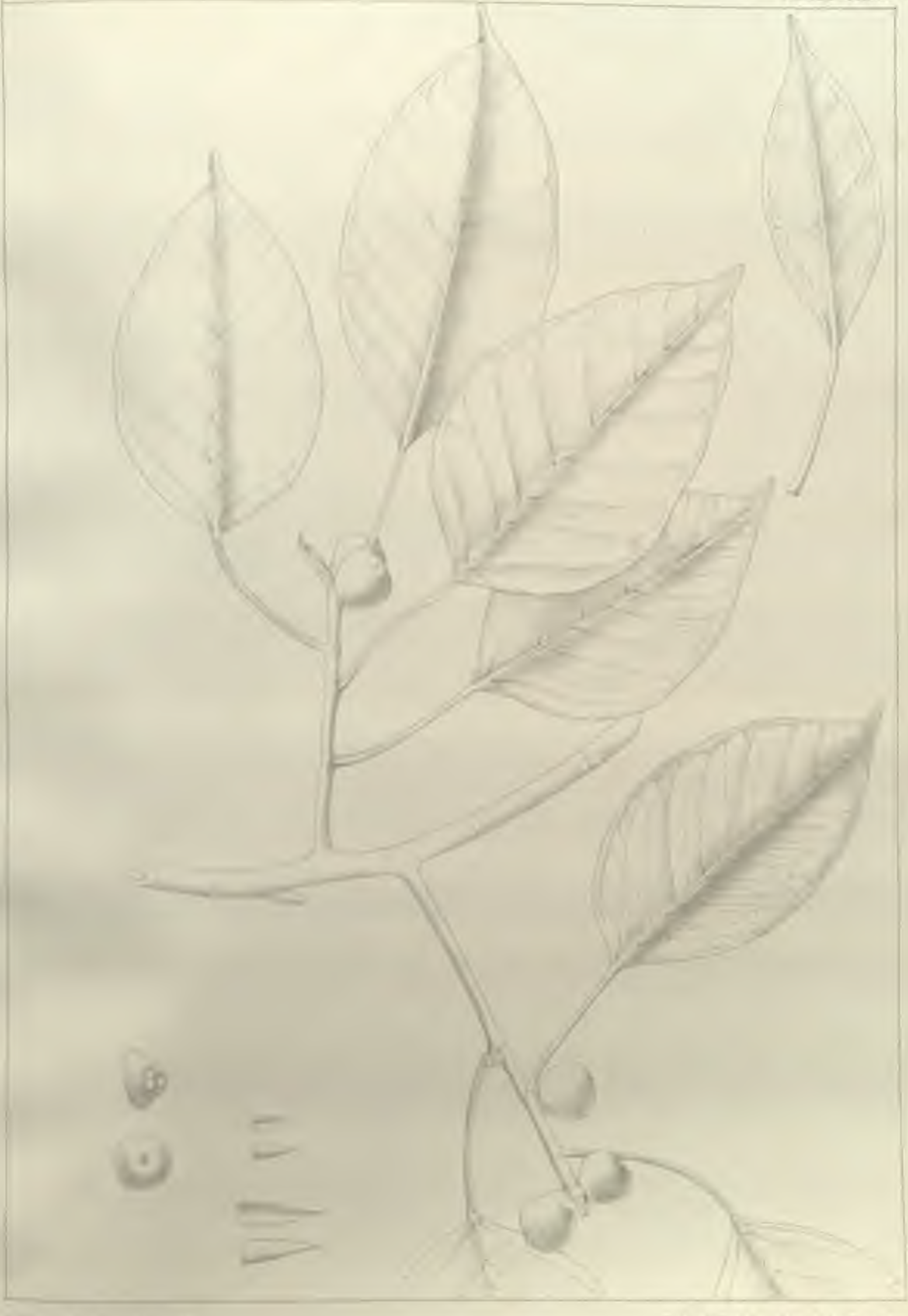


[illegible]

[illegible]

FICUS SUPERBA, Miq.

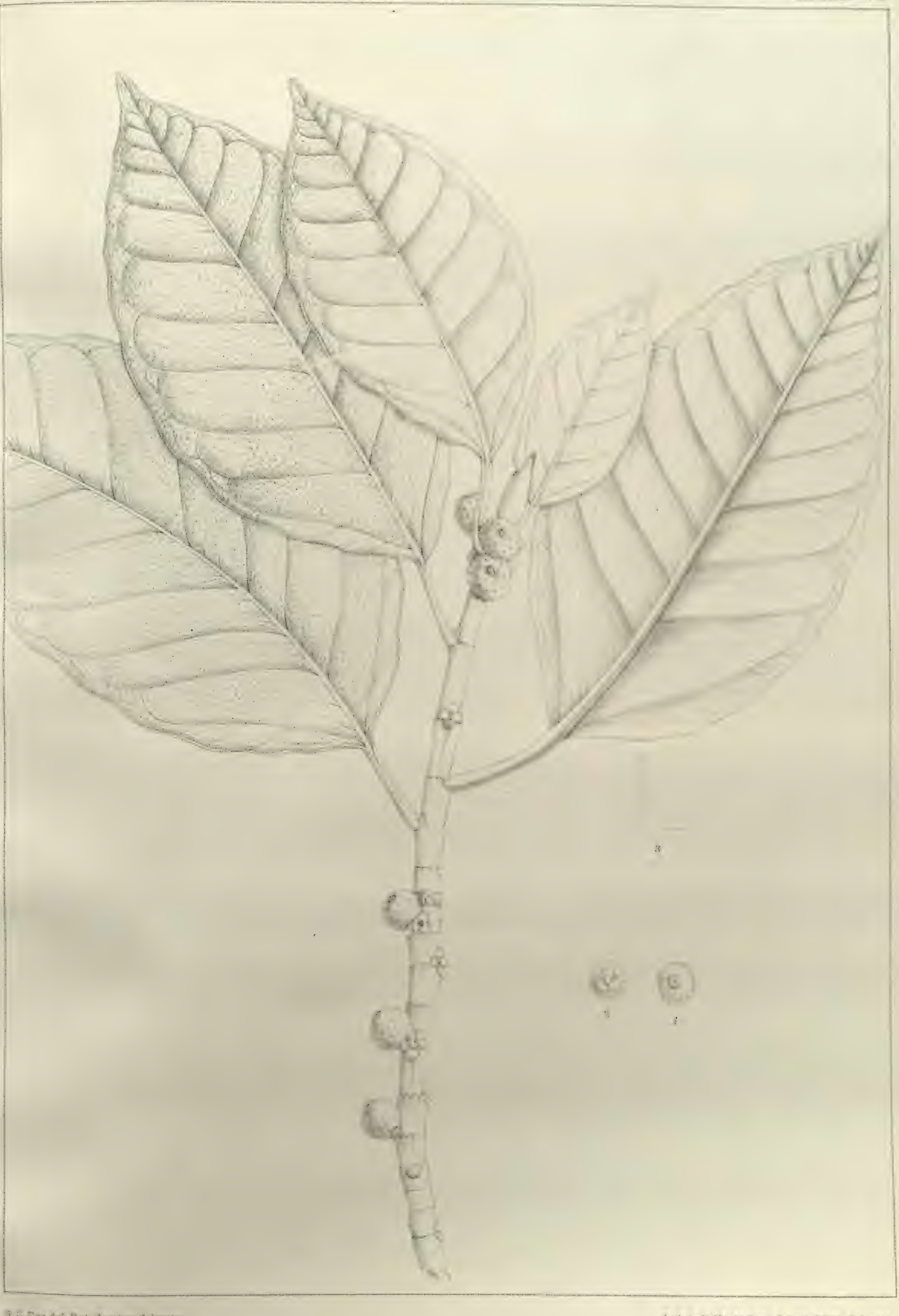
PLATE ~~XLV.~~ 73



[illegible] [illegible]

FICUS TSIELA, Roxb.

PLATE 74



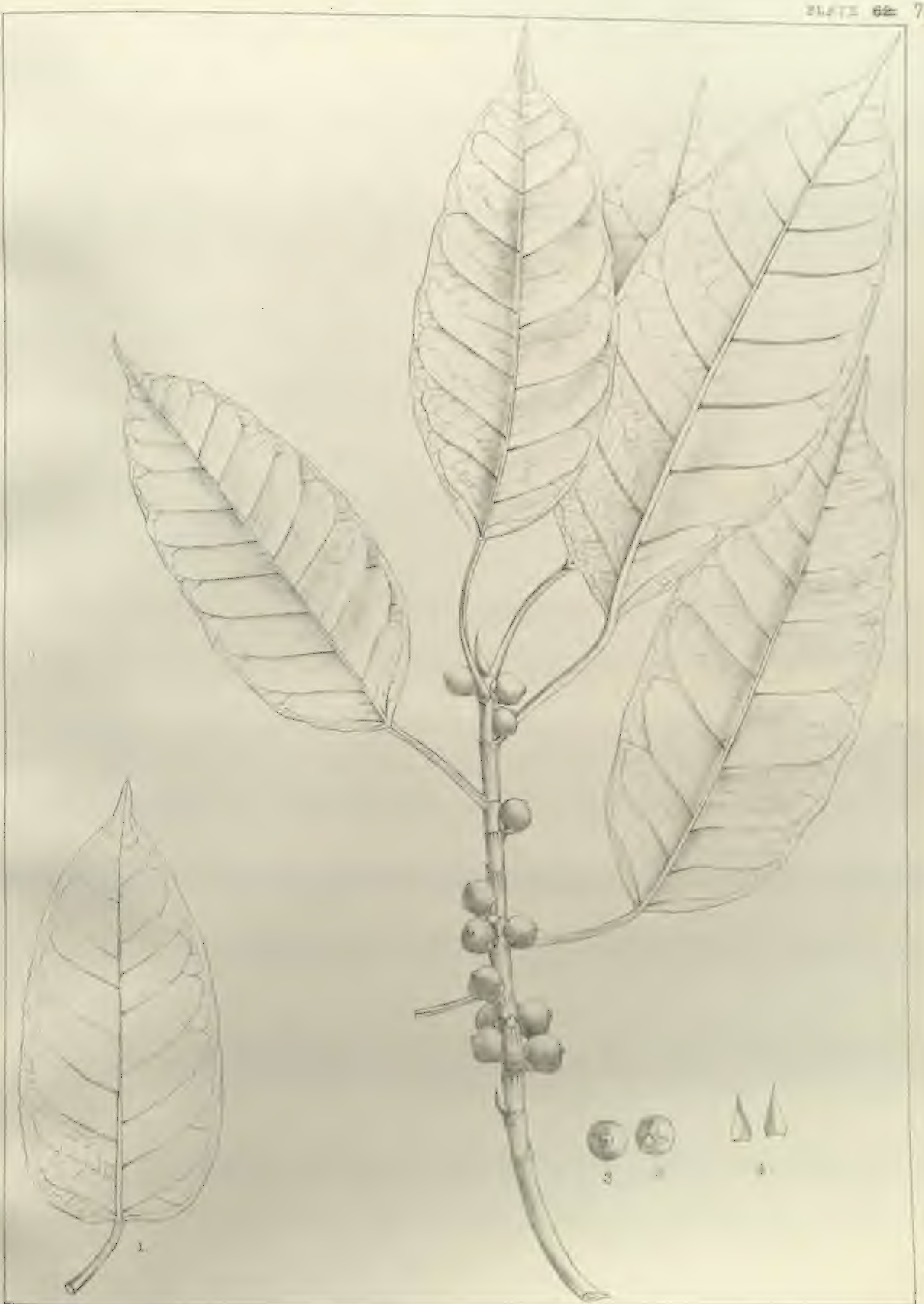
G. C. Das del. Bot. Garden Calcutta.

Lith. by D. Nandy Govt. School of Art, Calcutta.

W. Newman & Co. Ld. Imp.

FICUS PSEUDO-TSIELA. Miq.

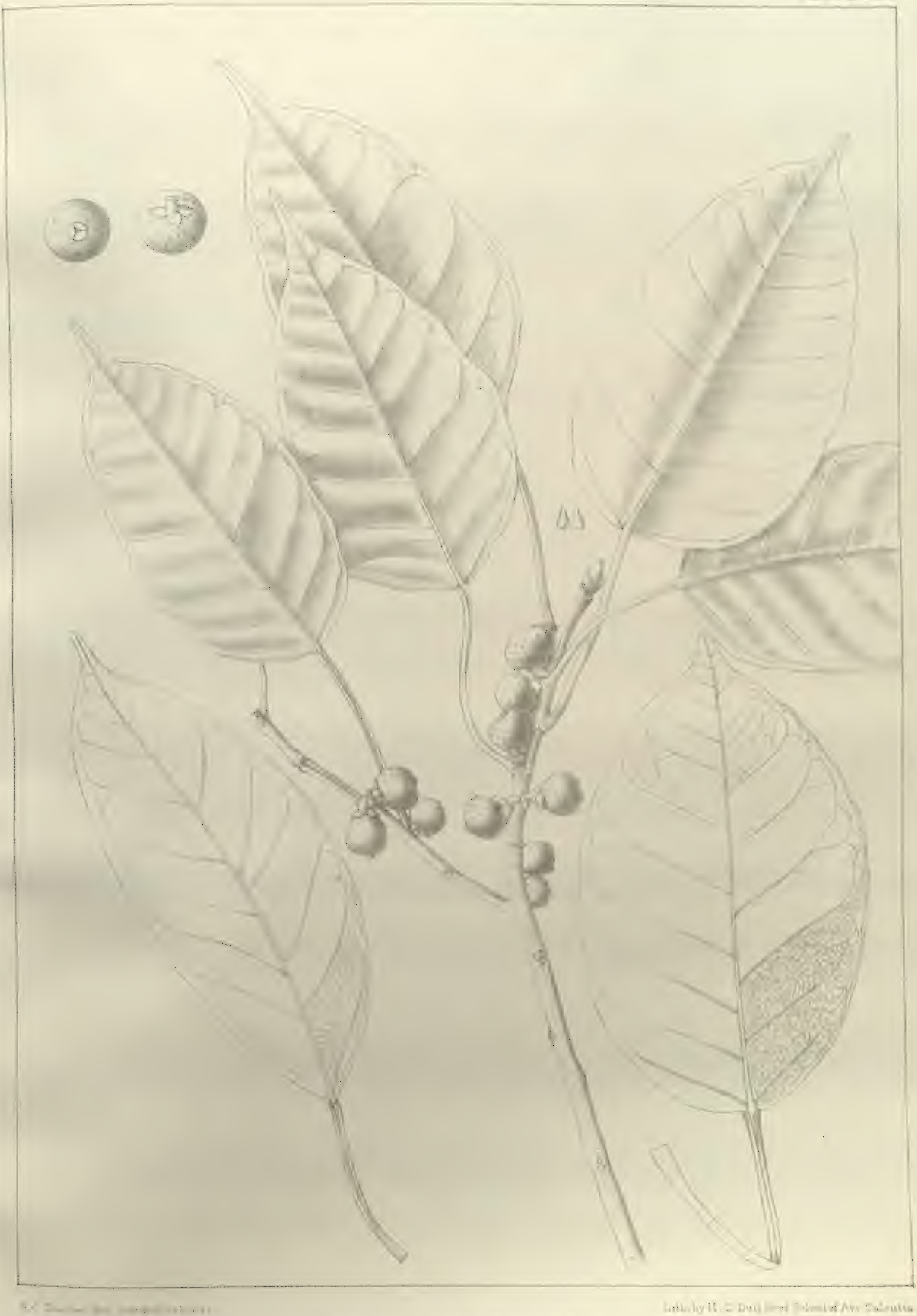
= FICUS TSIELA. Roxb.



G. C. Das del. Bot. Garden Calcutta

Lith. by B. L. Mookerjey Govt. School of Art Calcutta

FICUS INFECTORIA, Roxb. forma typica.

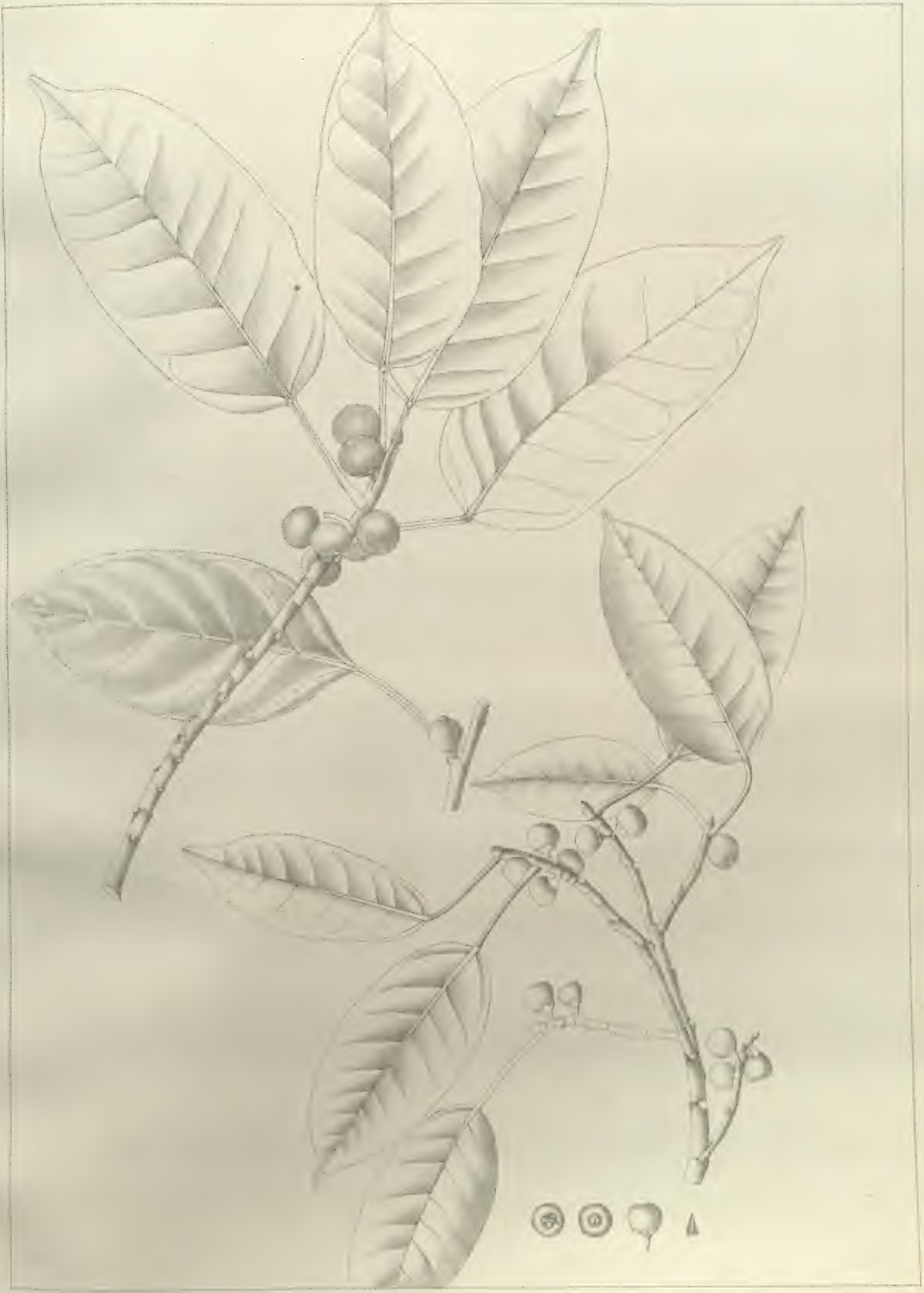


[illegible]

Lith. by H. C. Dutt Royal Botanical Gar. Calcutta.

FICUS LAMBERTIANA. Miq.

= FICUS INFECTORIA. Roxb. var. Lambertiana.

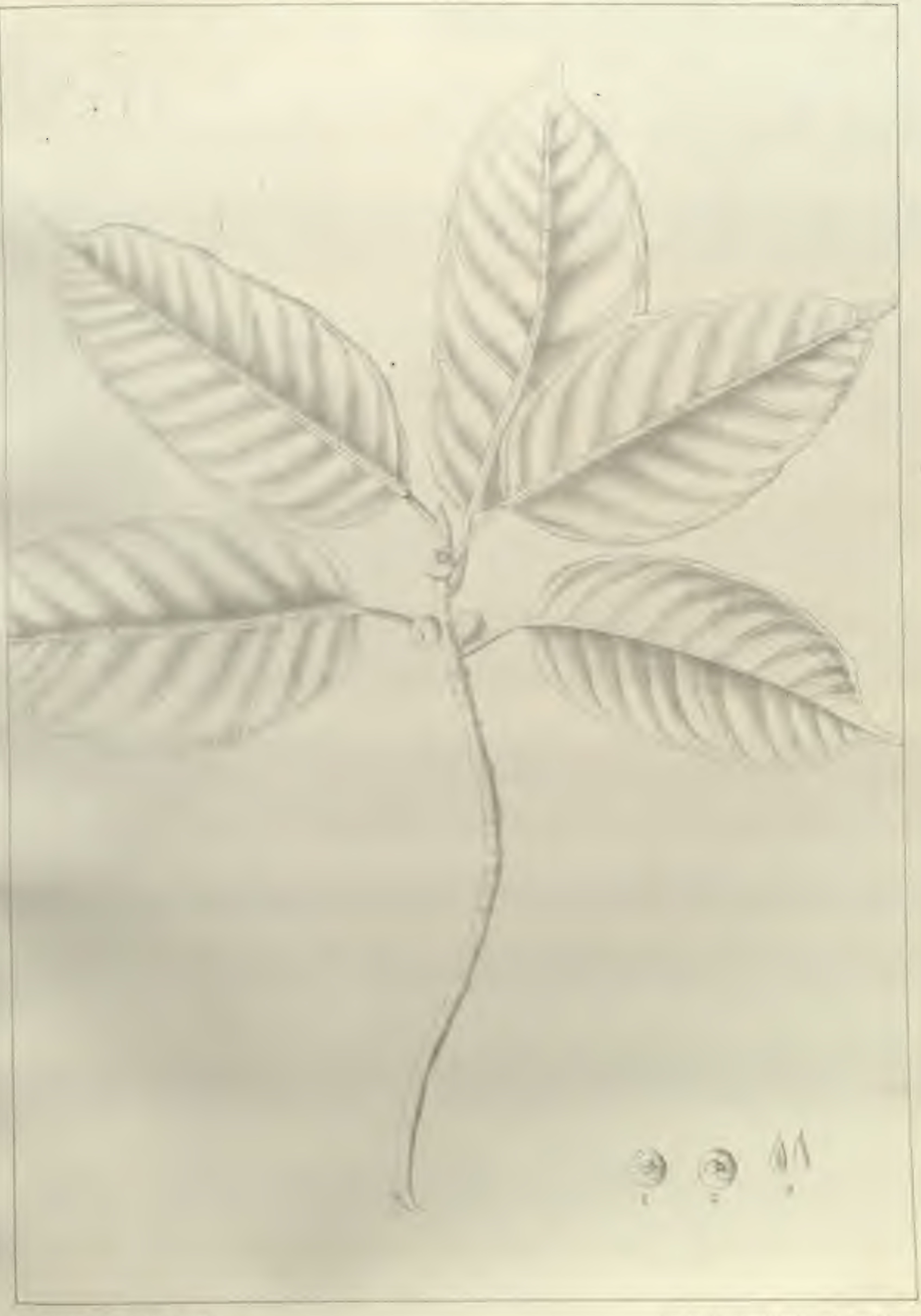


[illegible]

[illegible]

~~FICUS INFECTORIA Roxb. Var. Wightiana~~

PLATE 78

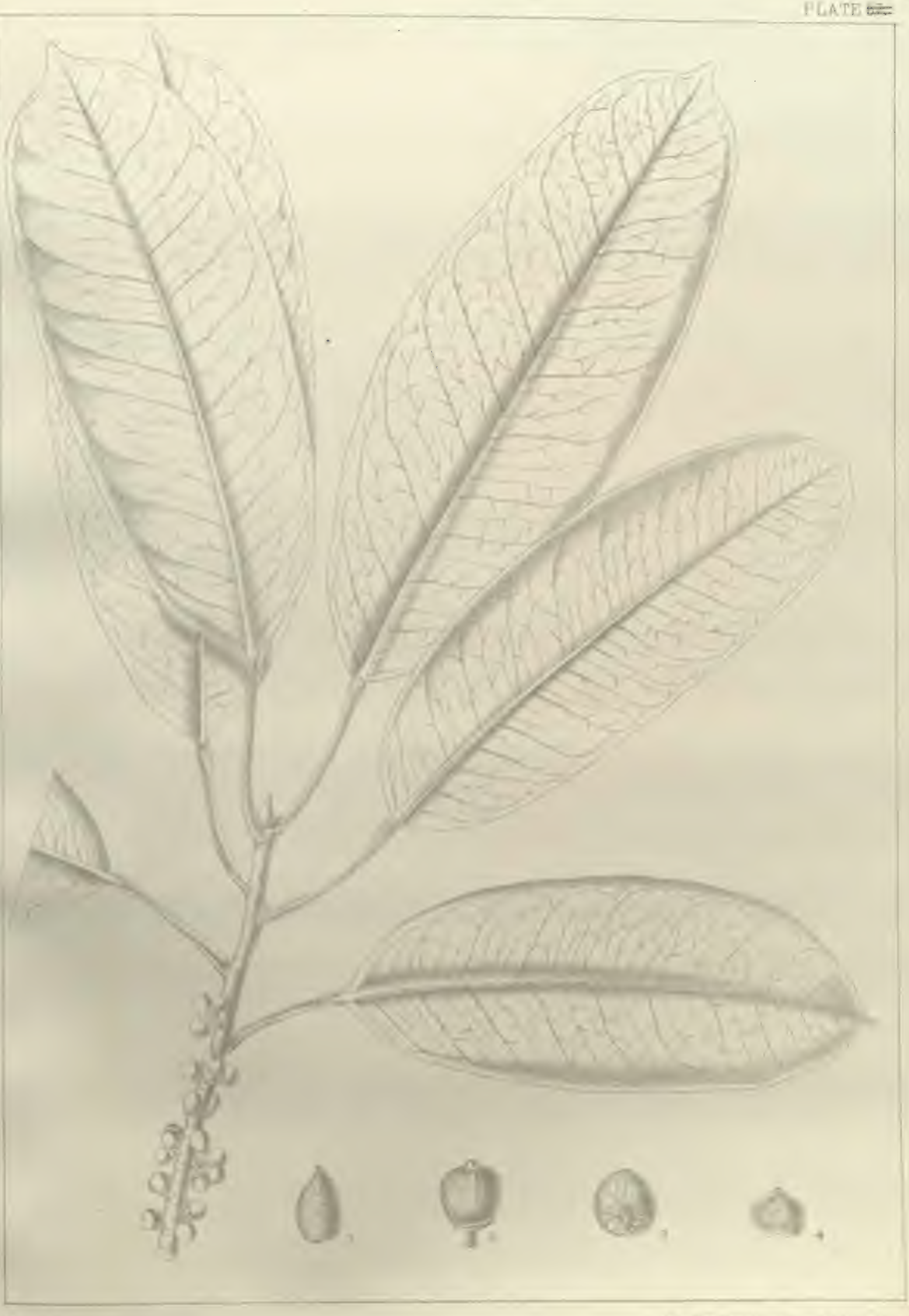


G. P. Pal del. Roy. Bot. Garden Calcutta.

Lith. by H. C. Ganguli, Govt. School of Art Calcutta.

FICUS INFECTORIA, Roxb. VAR. FORBESII.

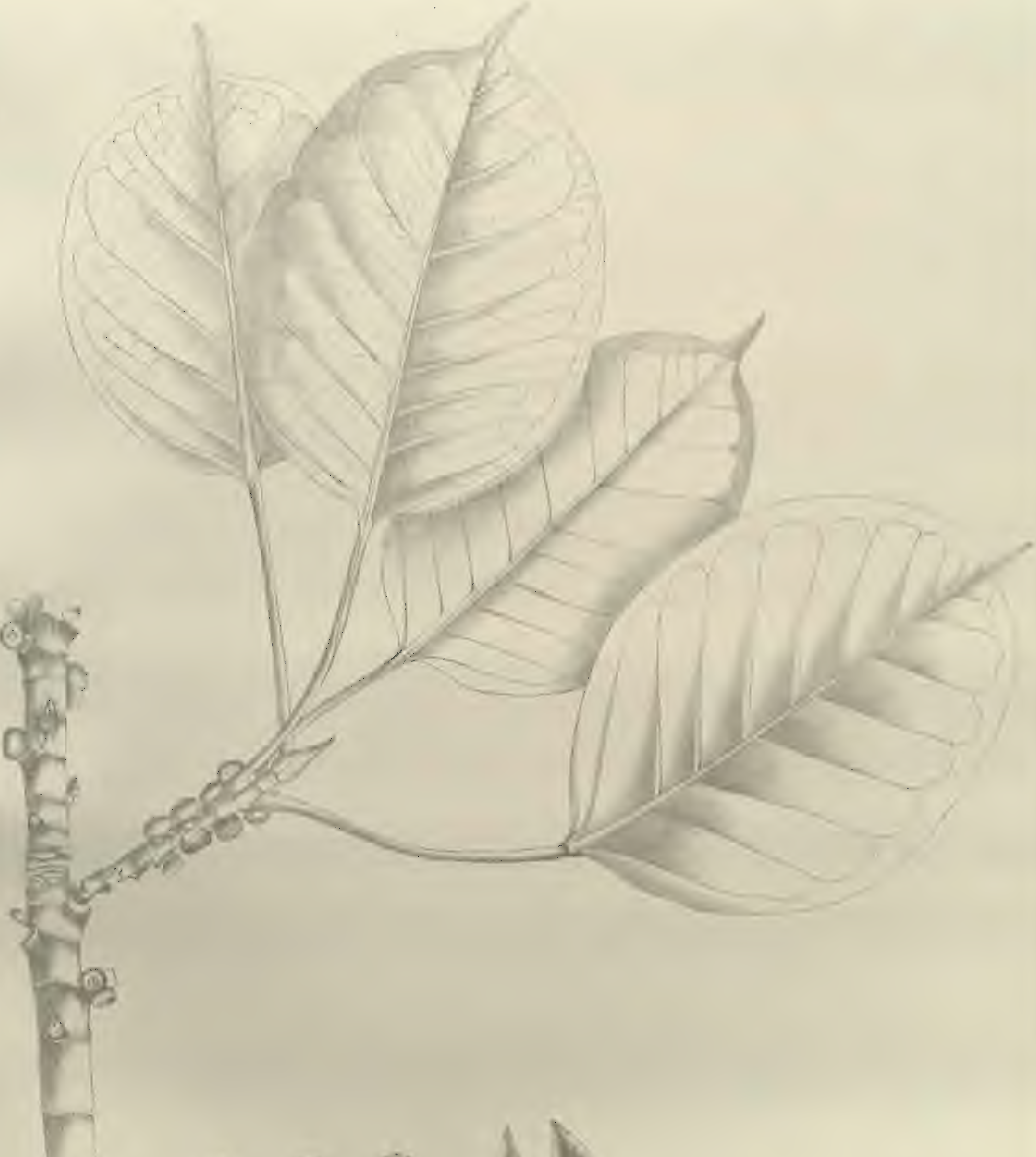
PLATE 79



M. [illegible] del.

Lith. by [illegible]

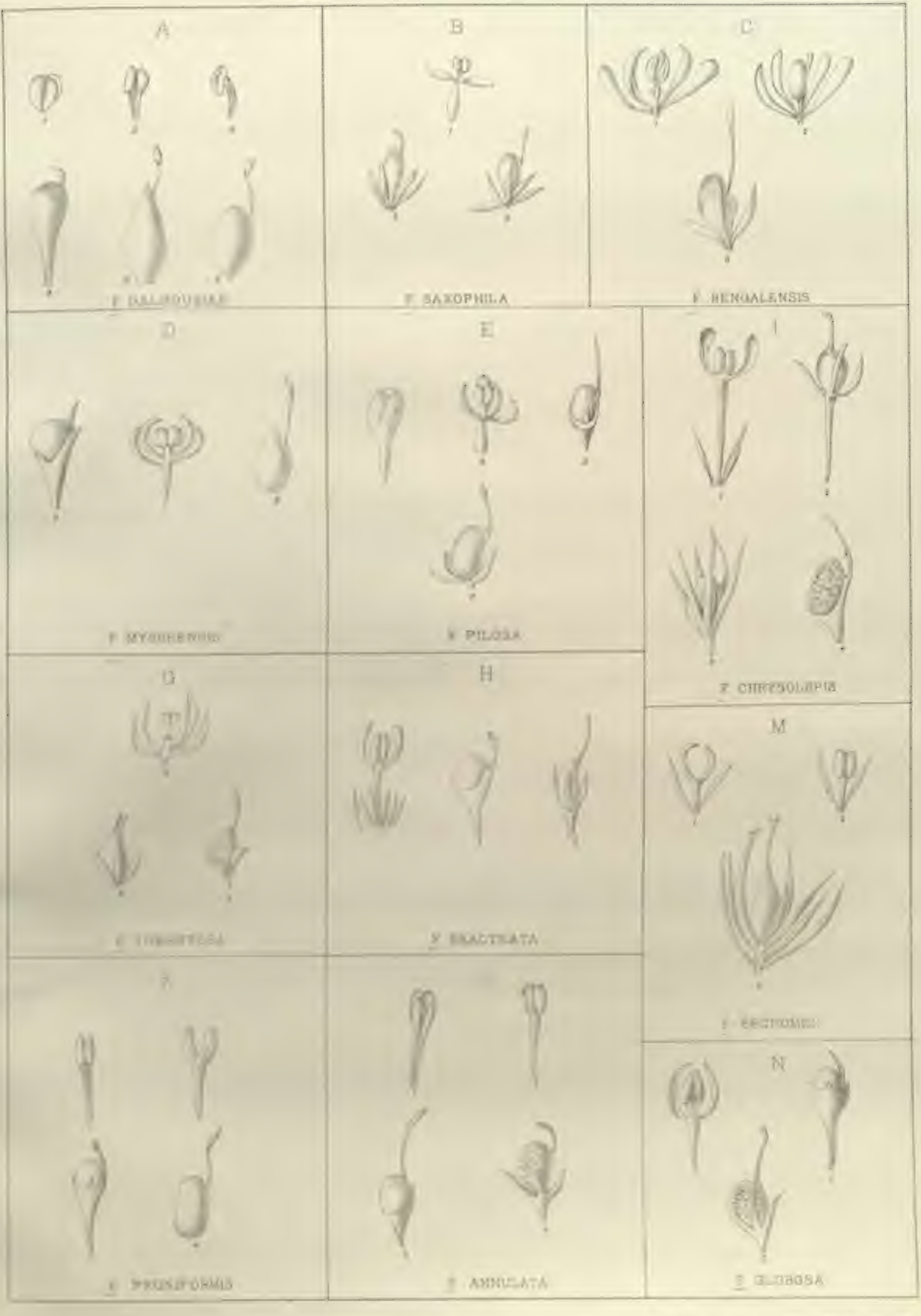
FICUS INFECTORIA, Roxb. VAR. CAULOCARPA.



S. C. Das del. Bot. Garden Calcutta

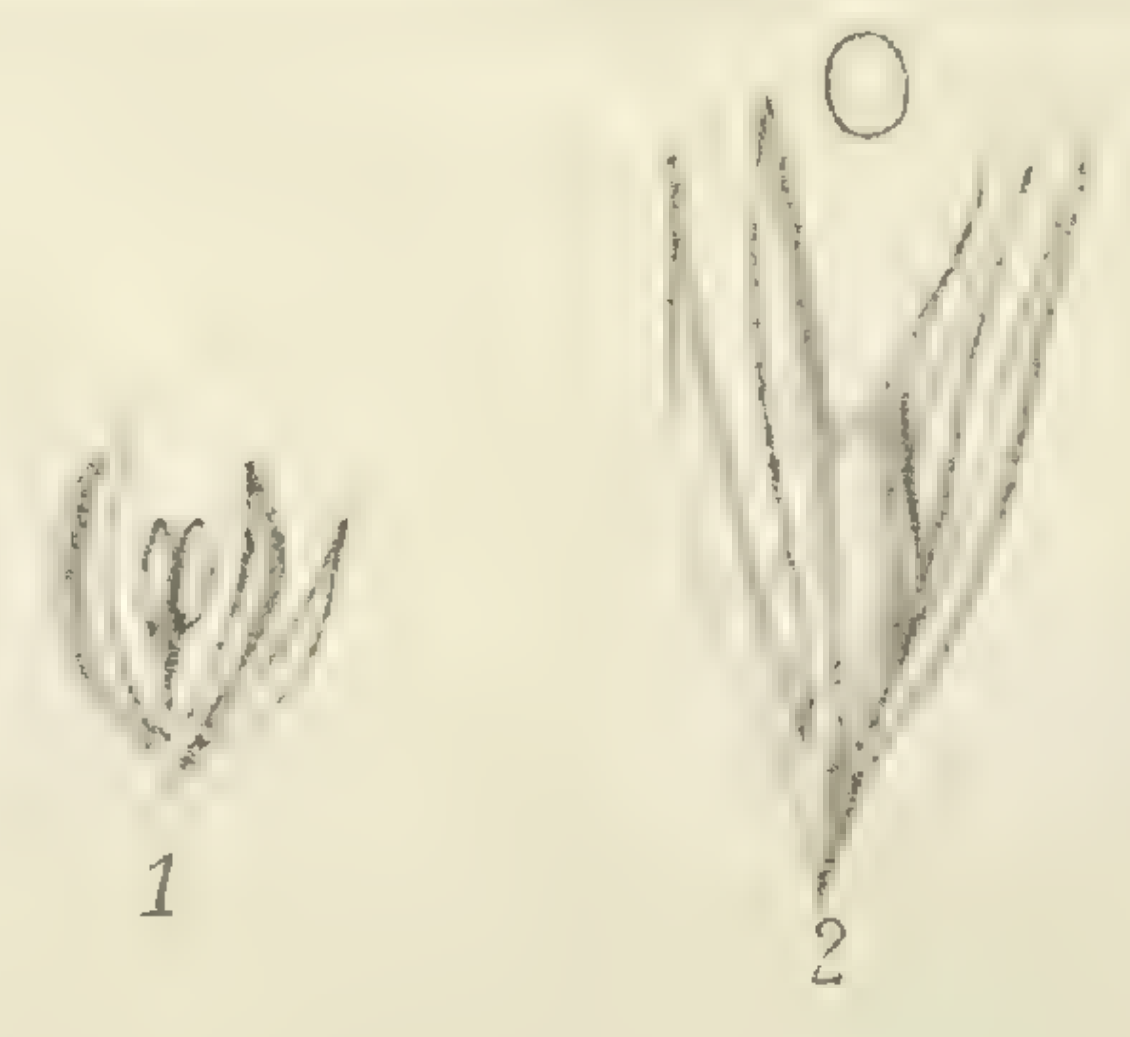
Lith. by D. Heegy Govt. School of Art Calcutta.

FICUS GENICULATA, Kurz.

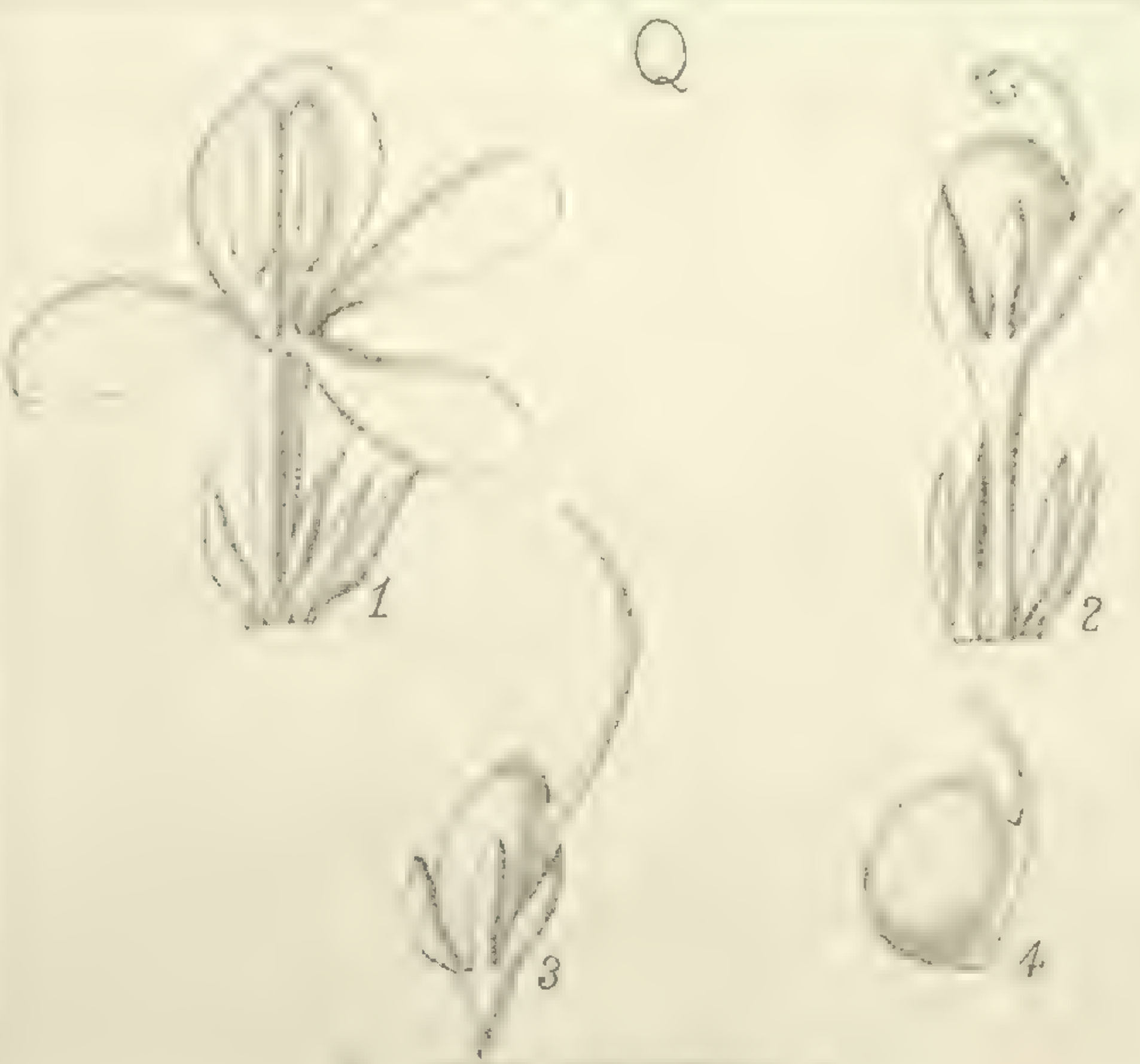

A
F. DALHOUSIAE
B
F. SAXOPHILA
C
F. BENGALENSIS
D
F. MYSORENSIS
E
F. PILOSA
I
F. CHRYSOLEPIS
G
F. TOMENTOSA
H
F. BRACTEATA
M
F. BECCARII
K
F. PRUNIFORMIS
F. ANNULATA
N
F. GLOBOSA

[illegible]

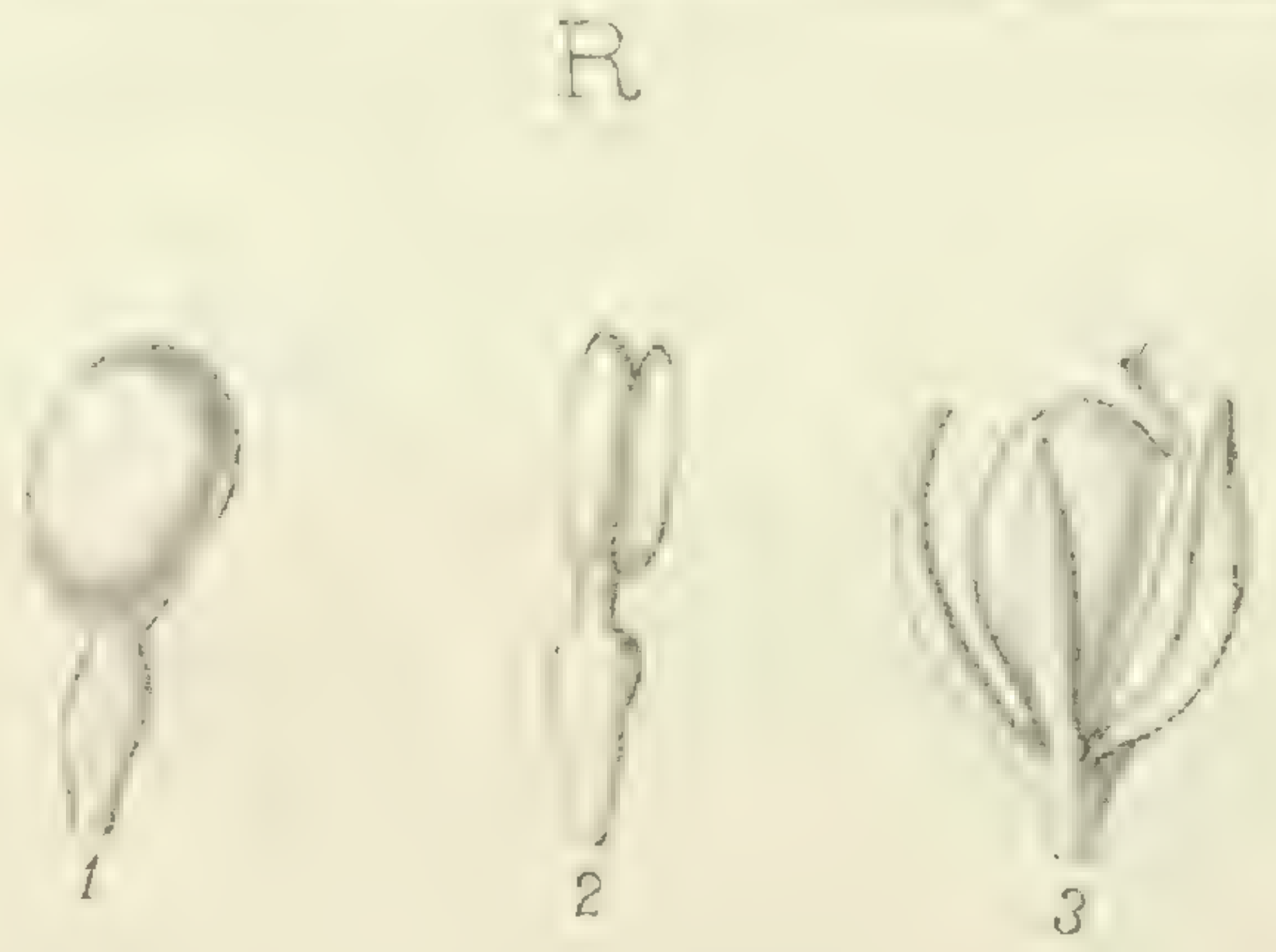
UROSTIGMA



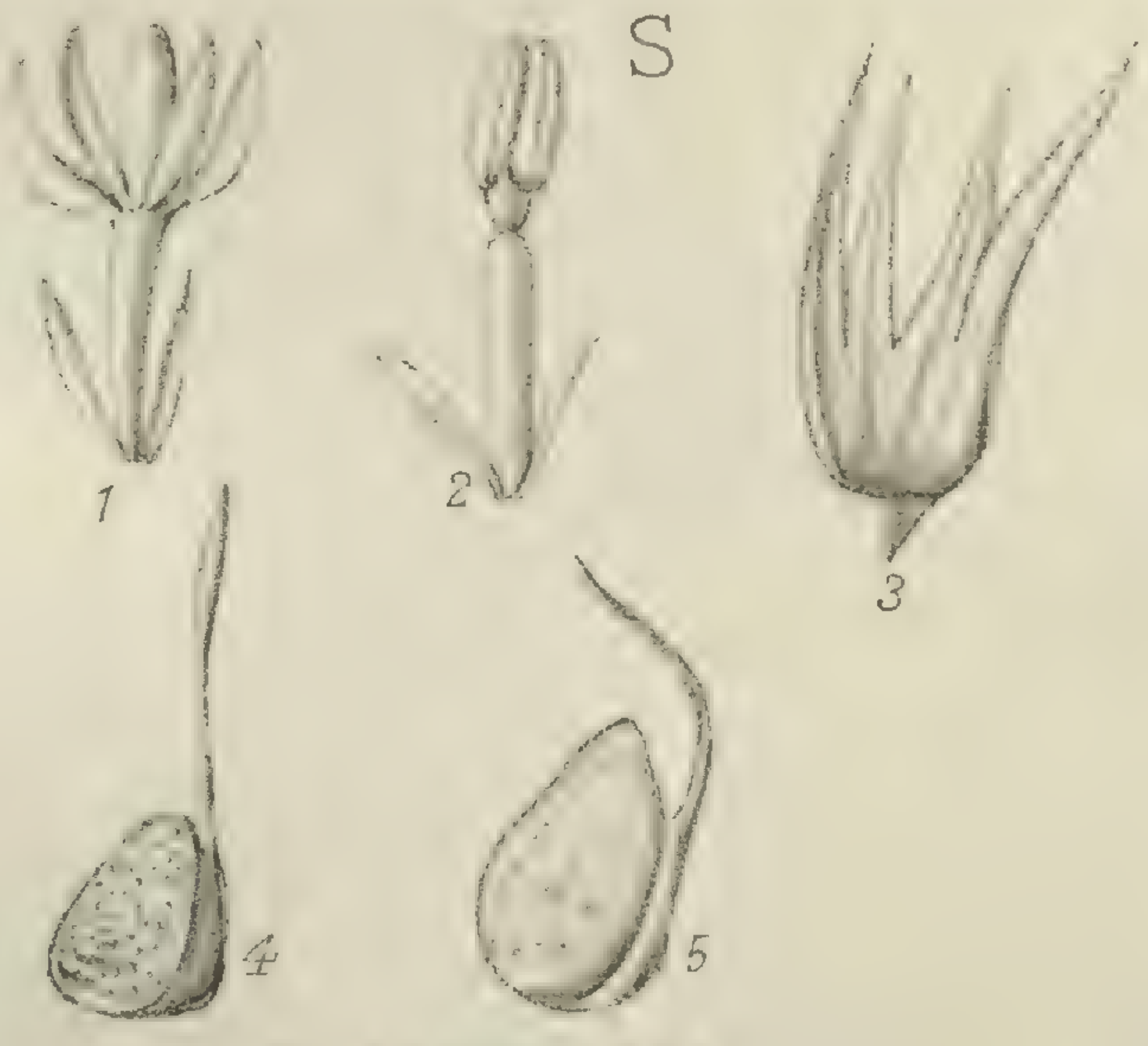
F. TRAVANCORICA



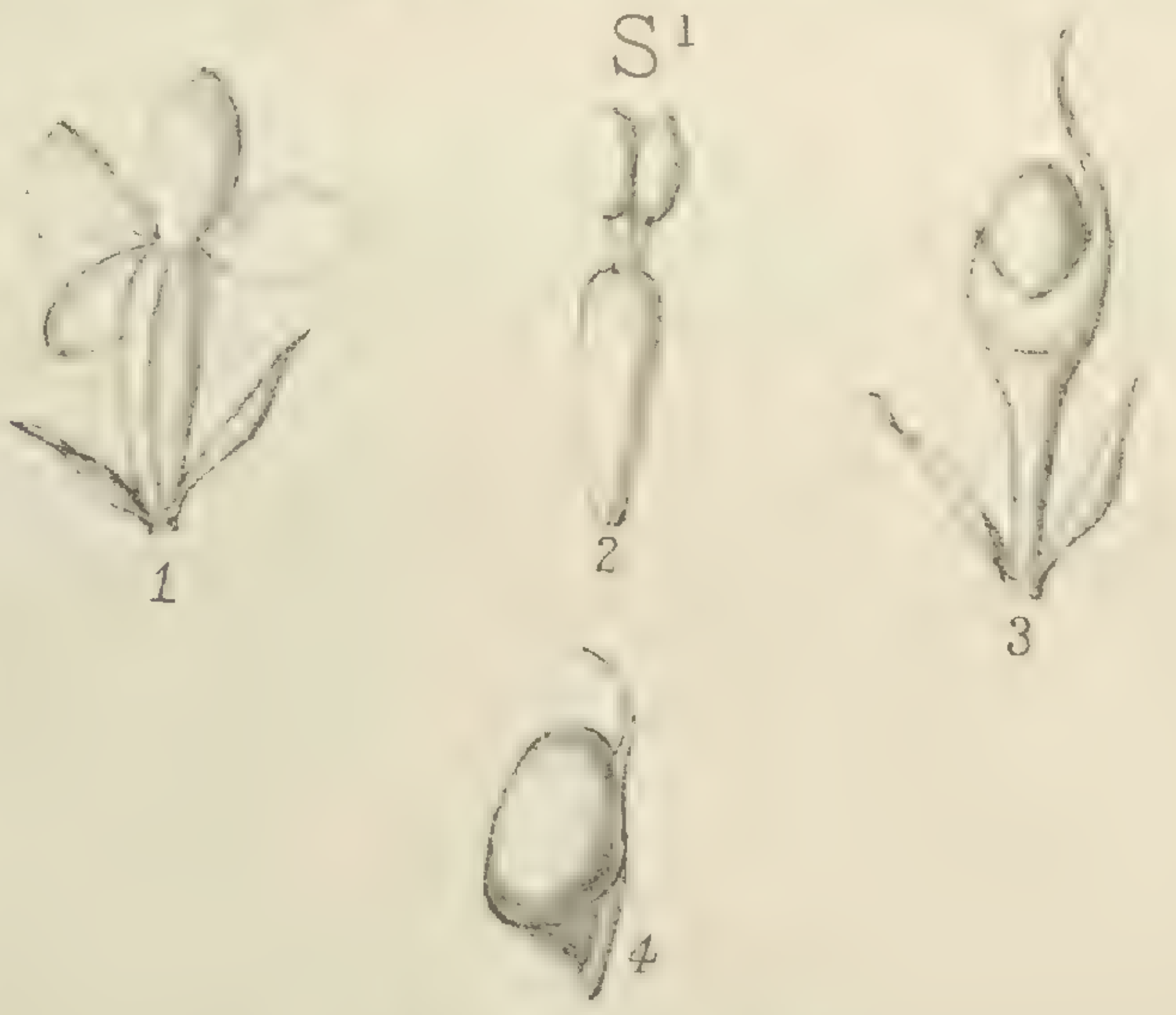
F. XYLOPHYLLA



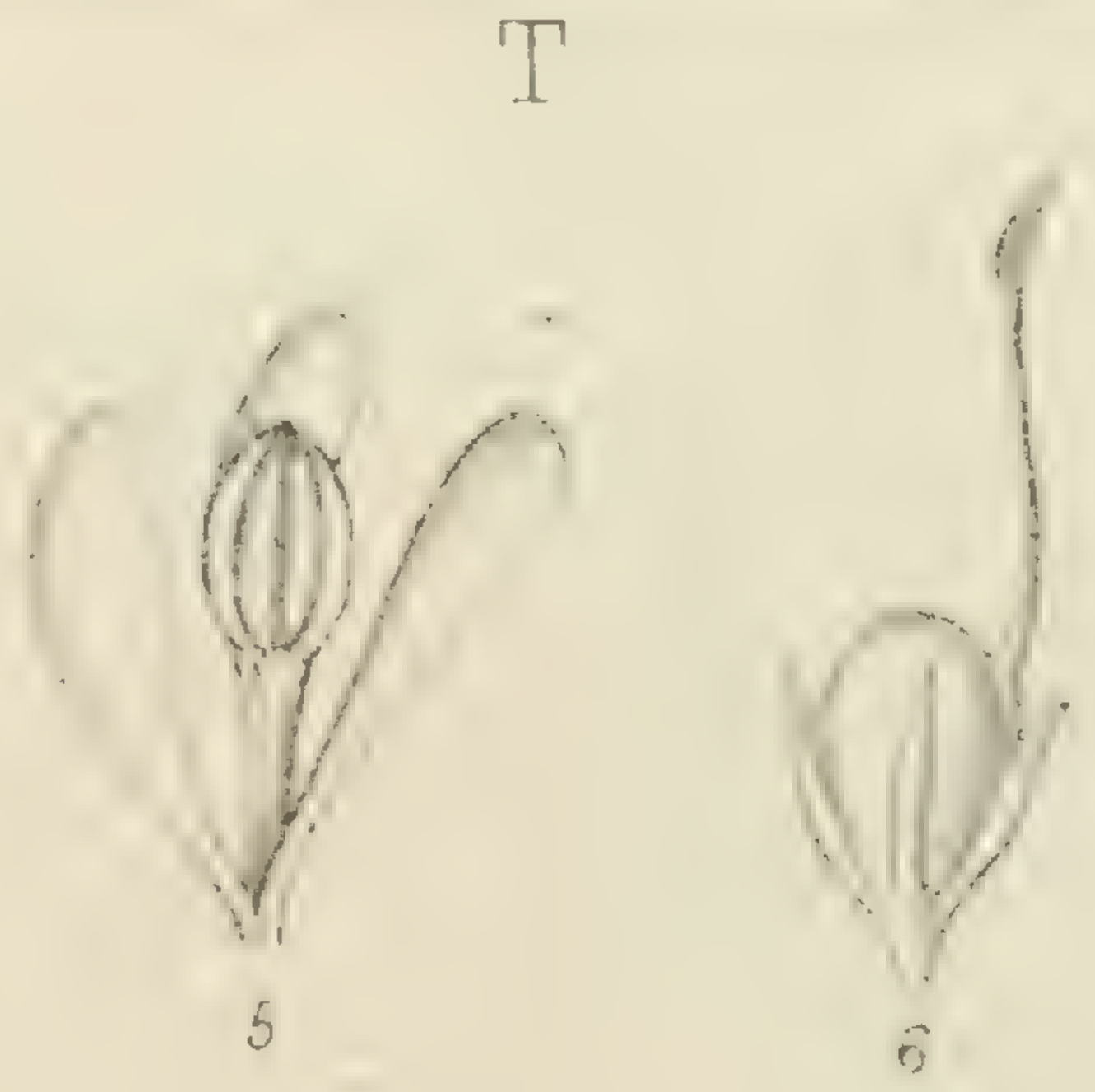
F. FORSTENI



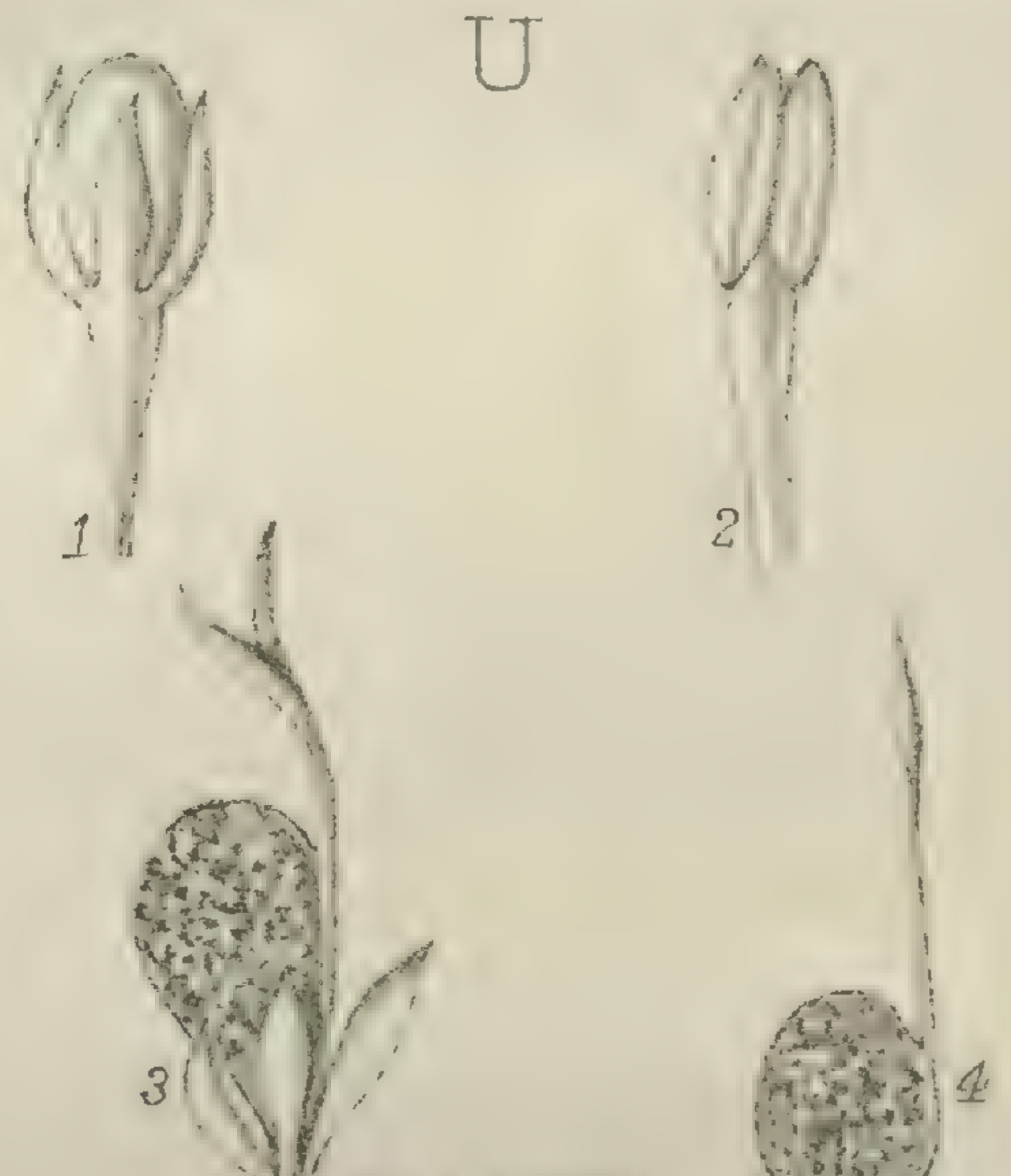
F. ALTISSIMA



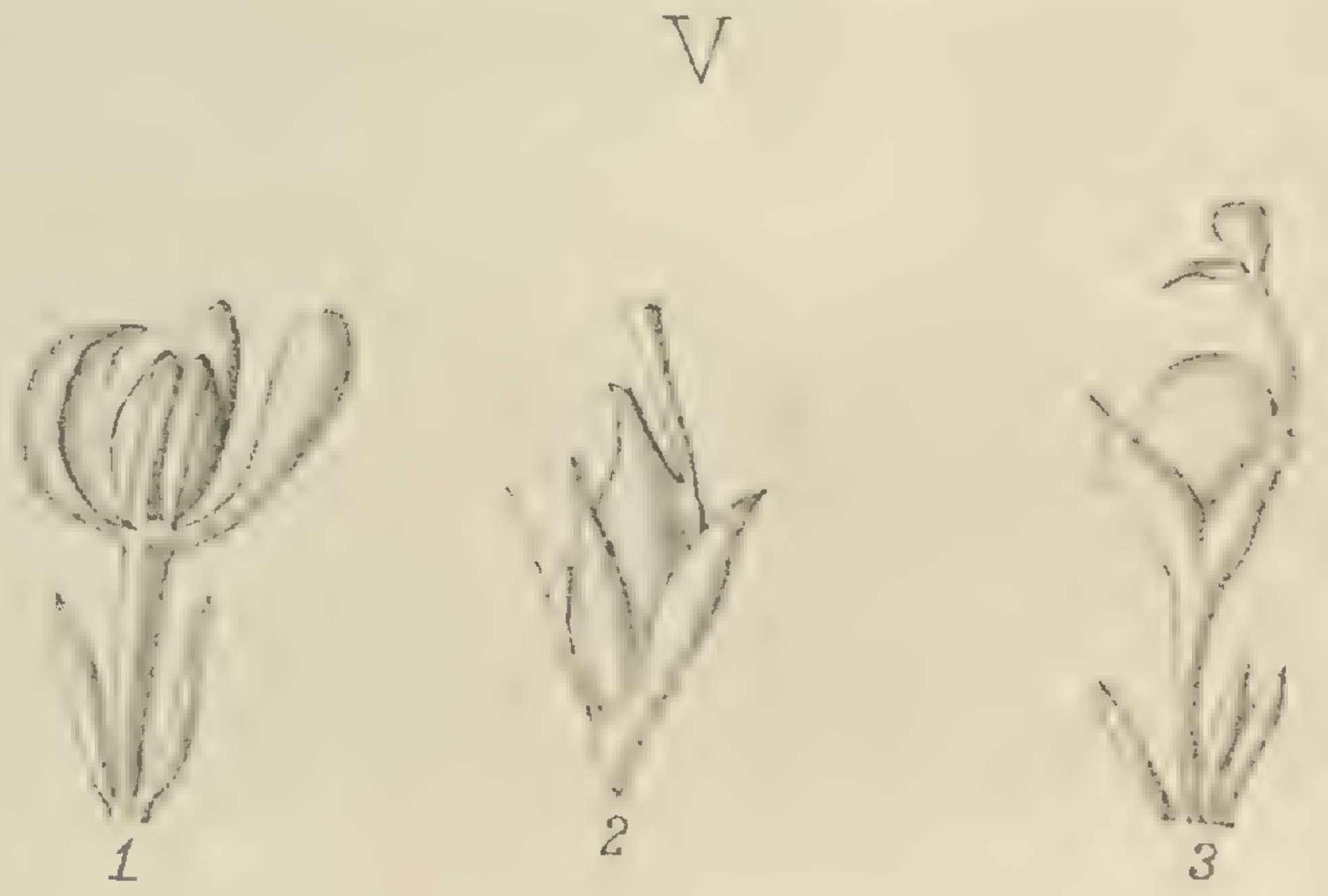
F. LACCIFERA



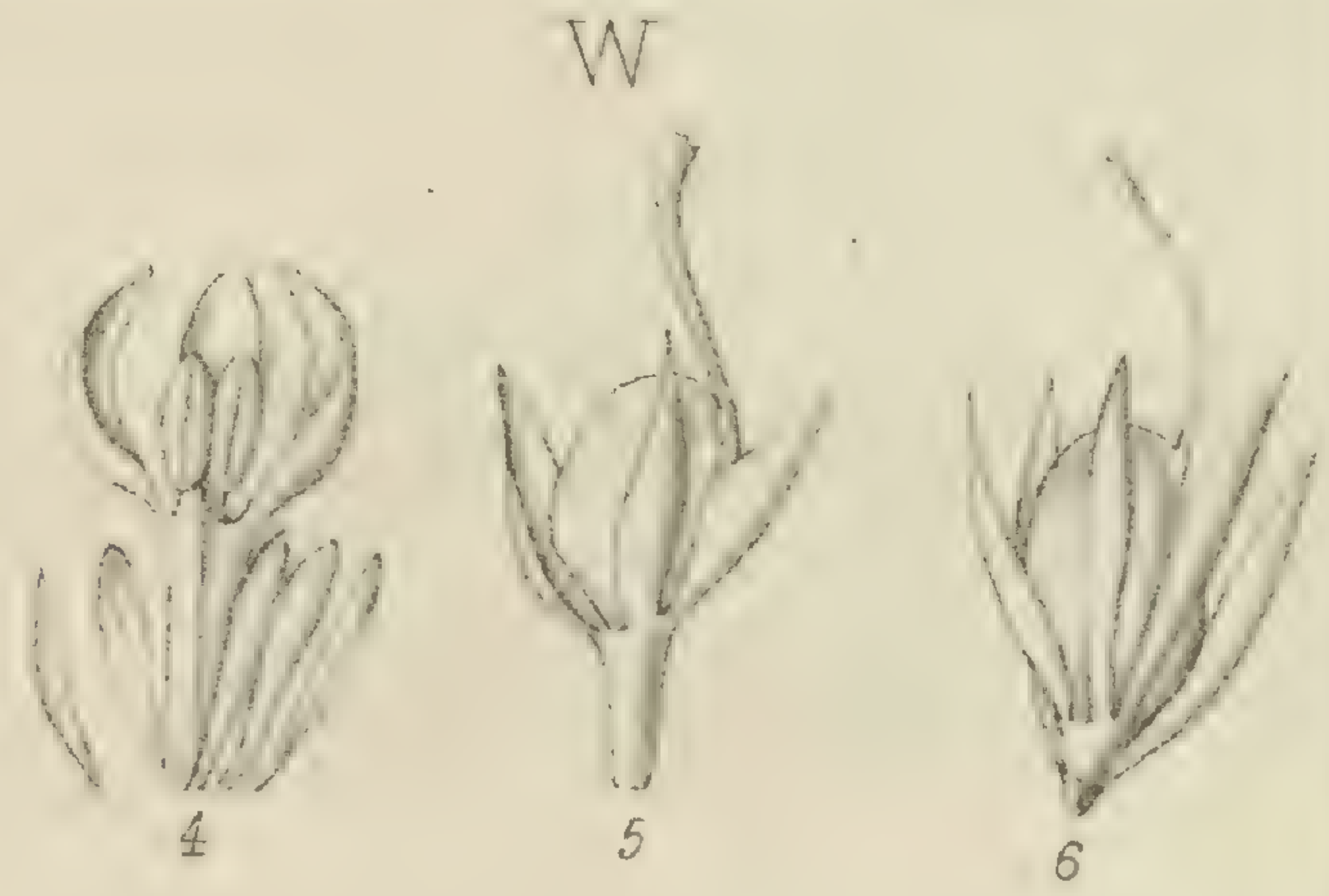
F. CYCLONEURA



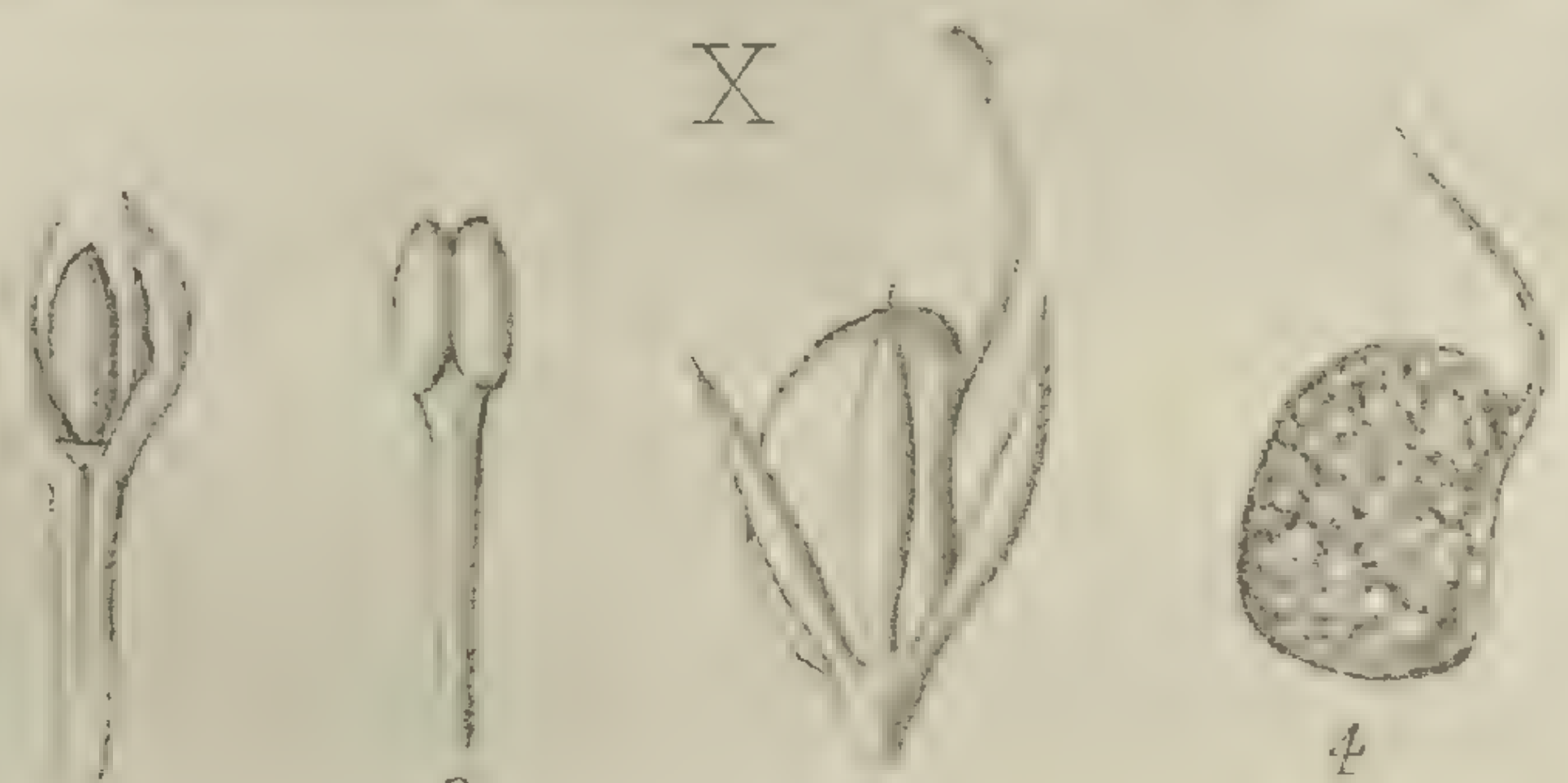
F. LOWII



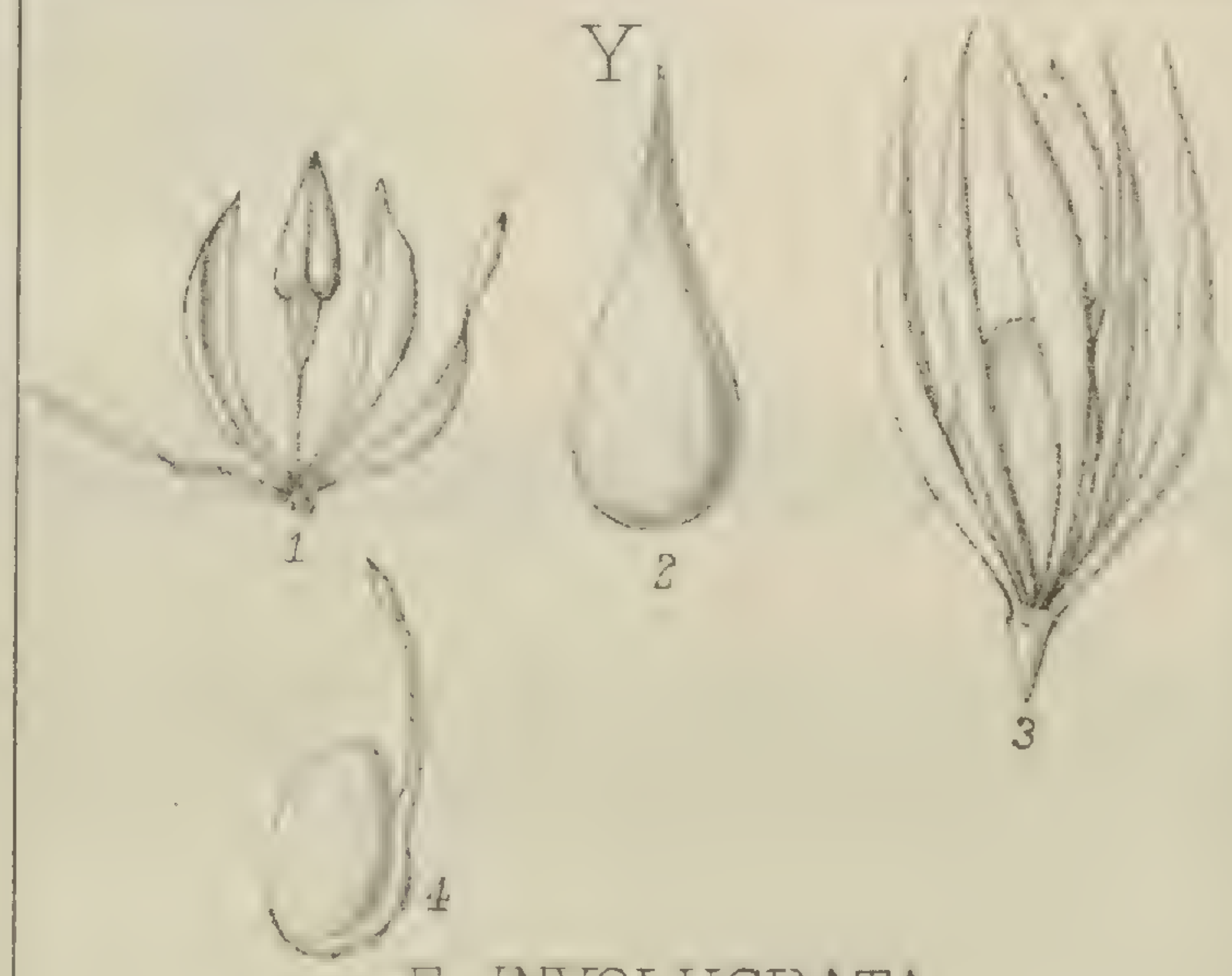
F. PACHYPHYLLA



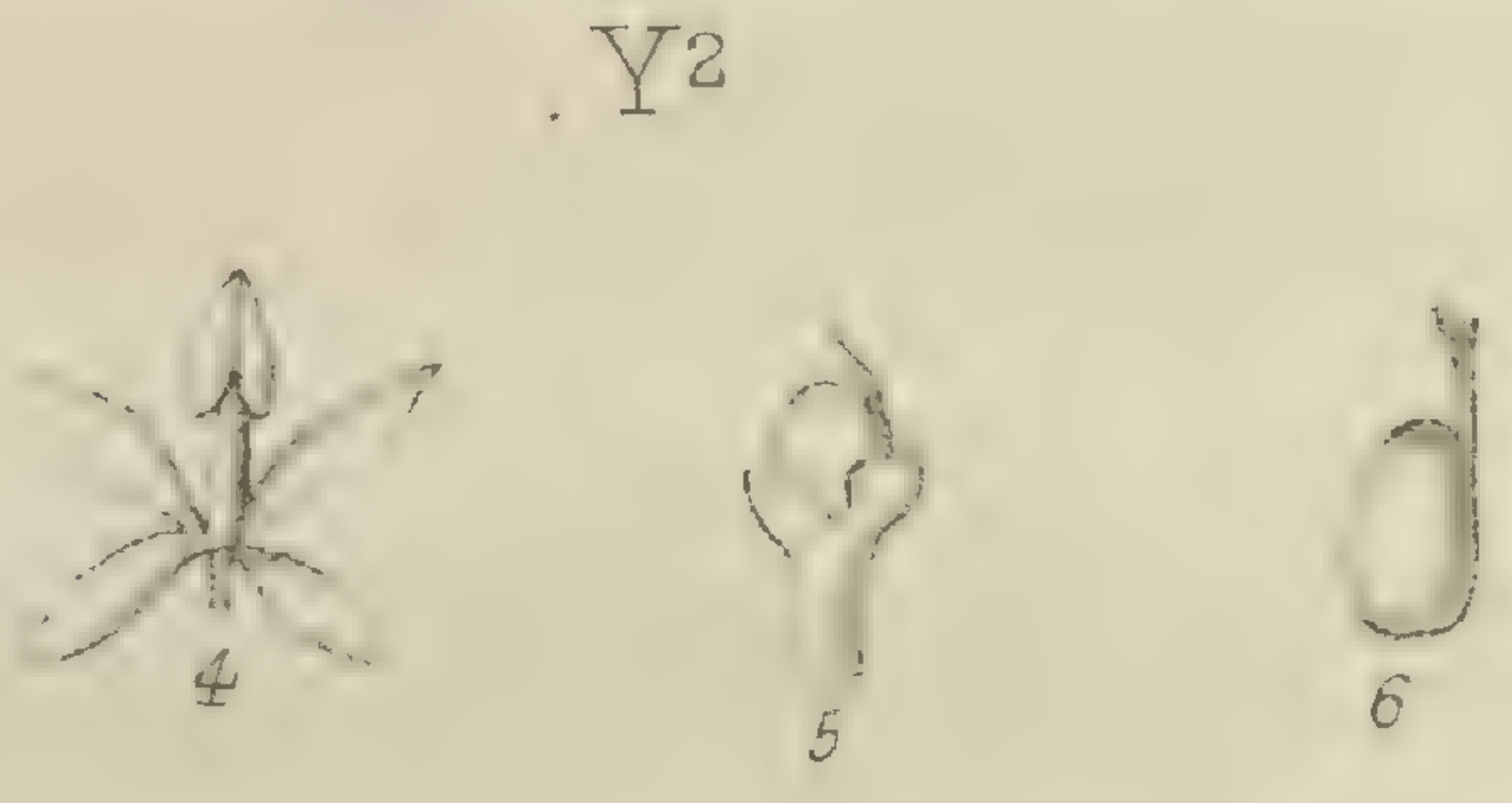
F. KORTHALSII



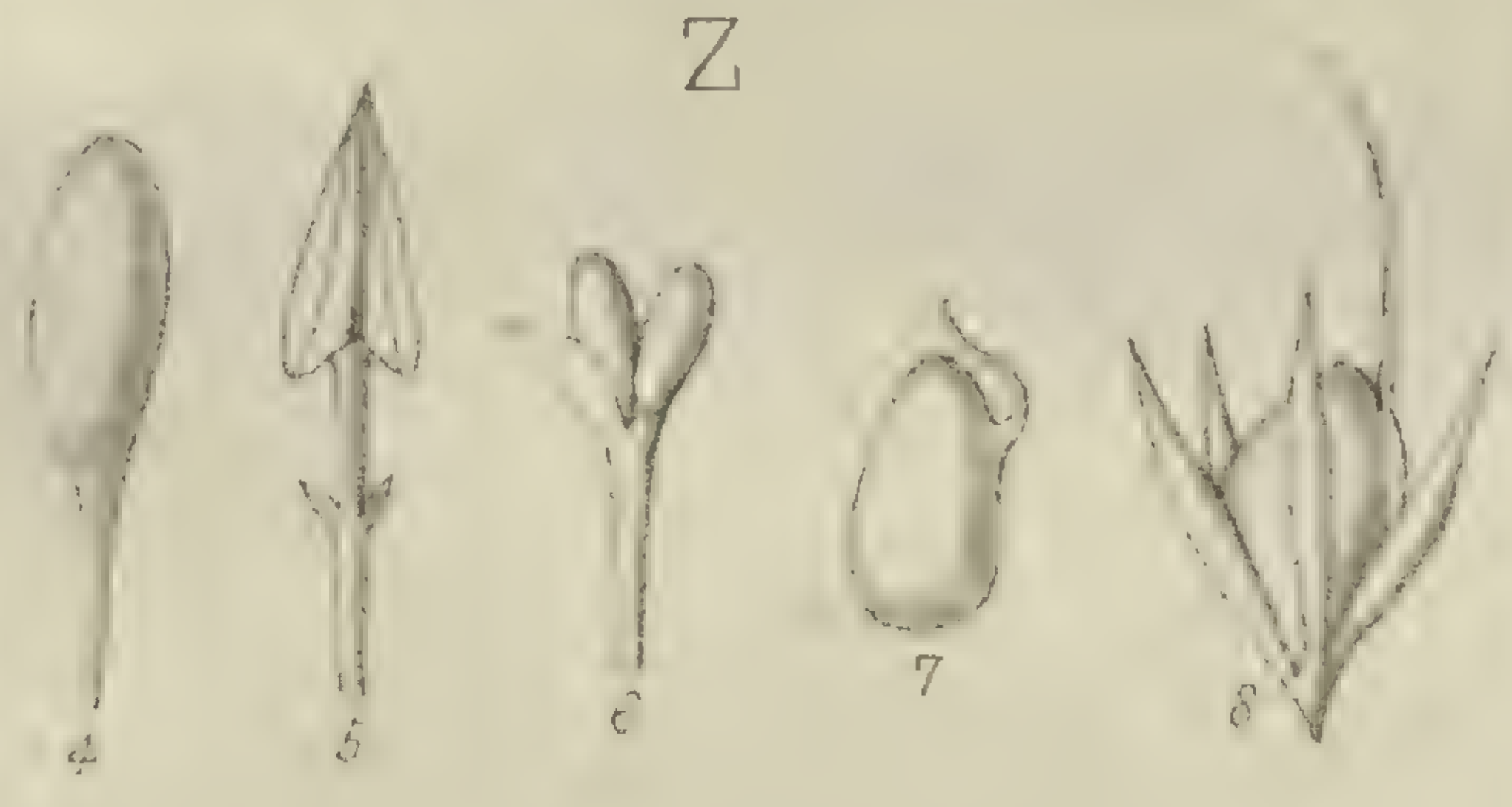
F. CONSOCIATA



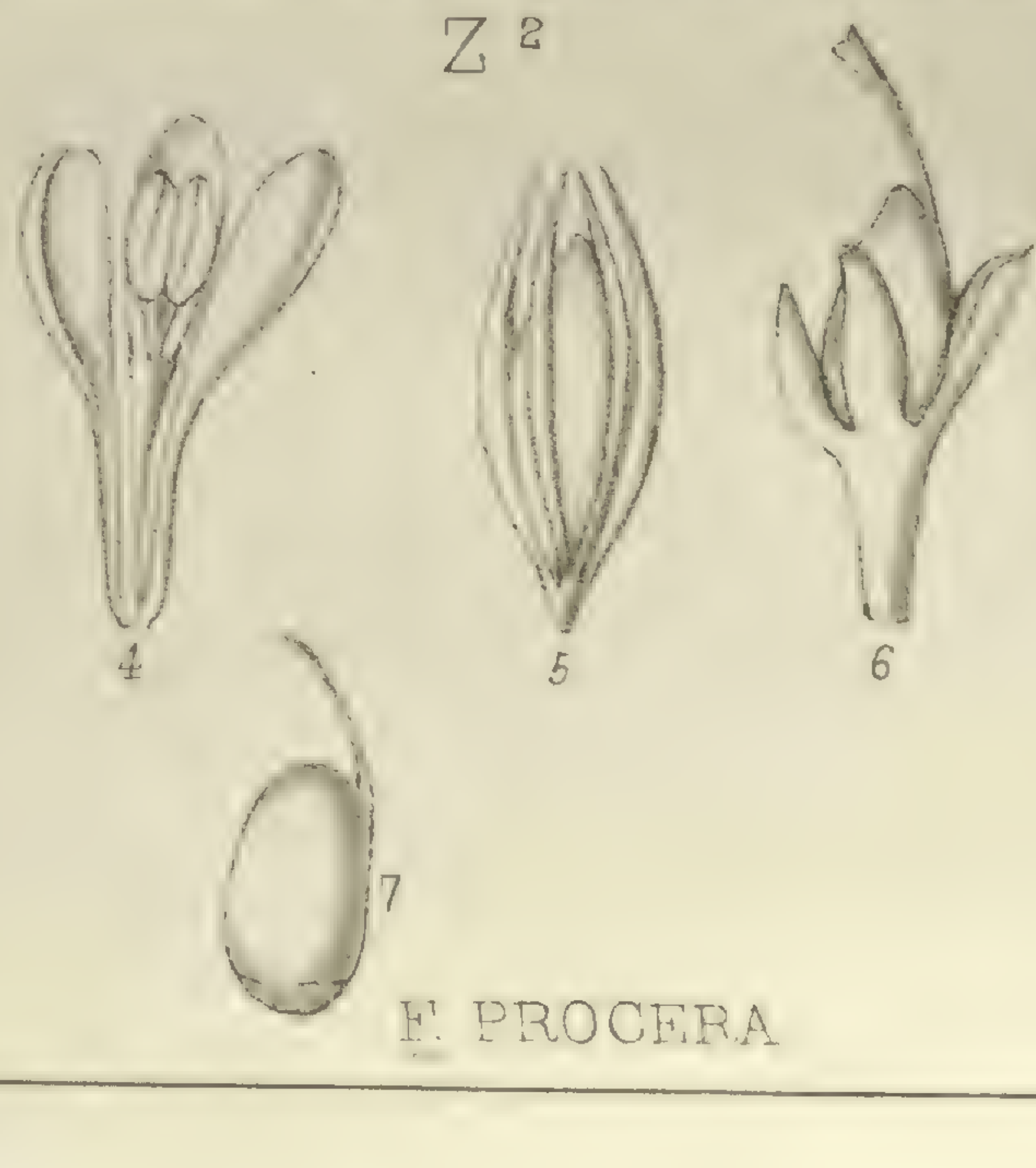
F. INVOLUCRATA



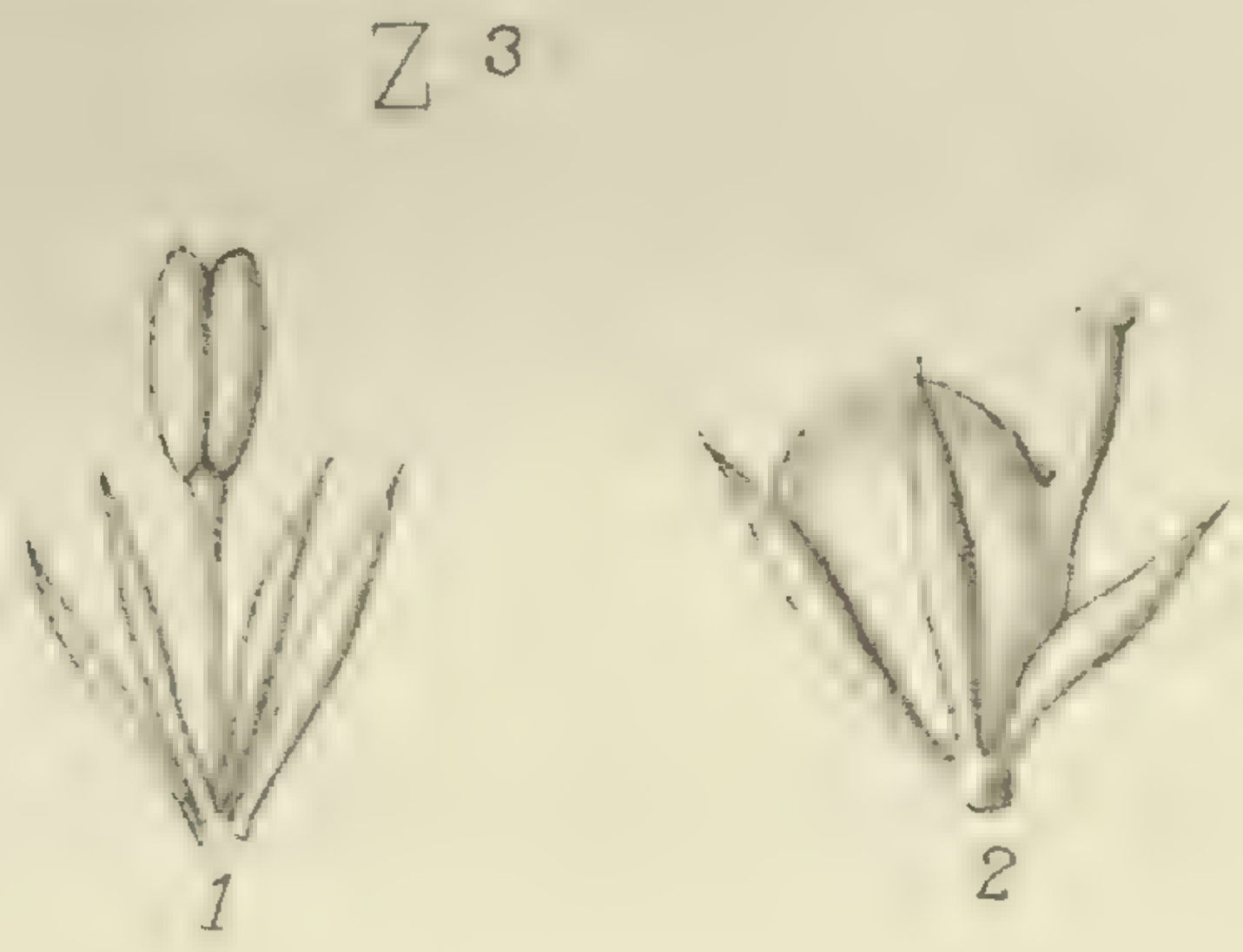
F. GLABERRIMA



F. RIGIDA



F. PROCERA



F. HOOKERI

Lith. at the Survey of India Offices, Calcutta, Jan. 1887.

UROSTIGMA

PLATE. 83.

F. MICROSTOMA

F. INDICA

F. SUMATRANA

F. ACAMPTOPHYLLA

F. BINNINDYKII

F. TRUNCATA

F. OBTUSIFOLIA

F. BENJAMINA

F. STRICTA

F. TRIMENI

F. DUBIA

F. KURZII

F. RHODODENDRIFOLIA

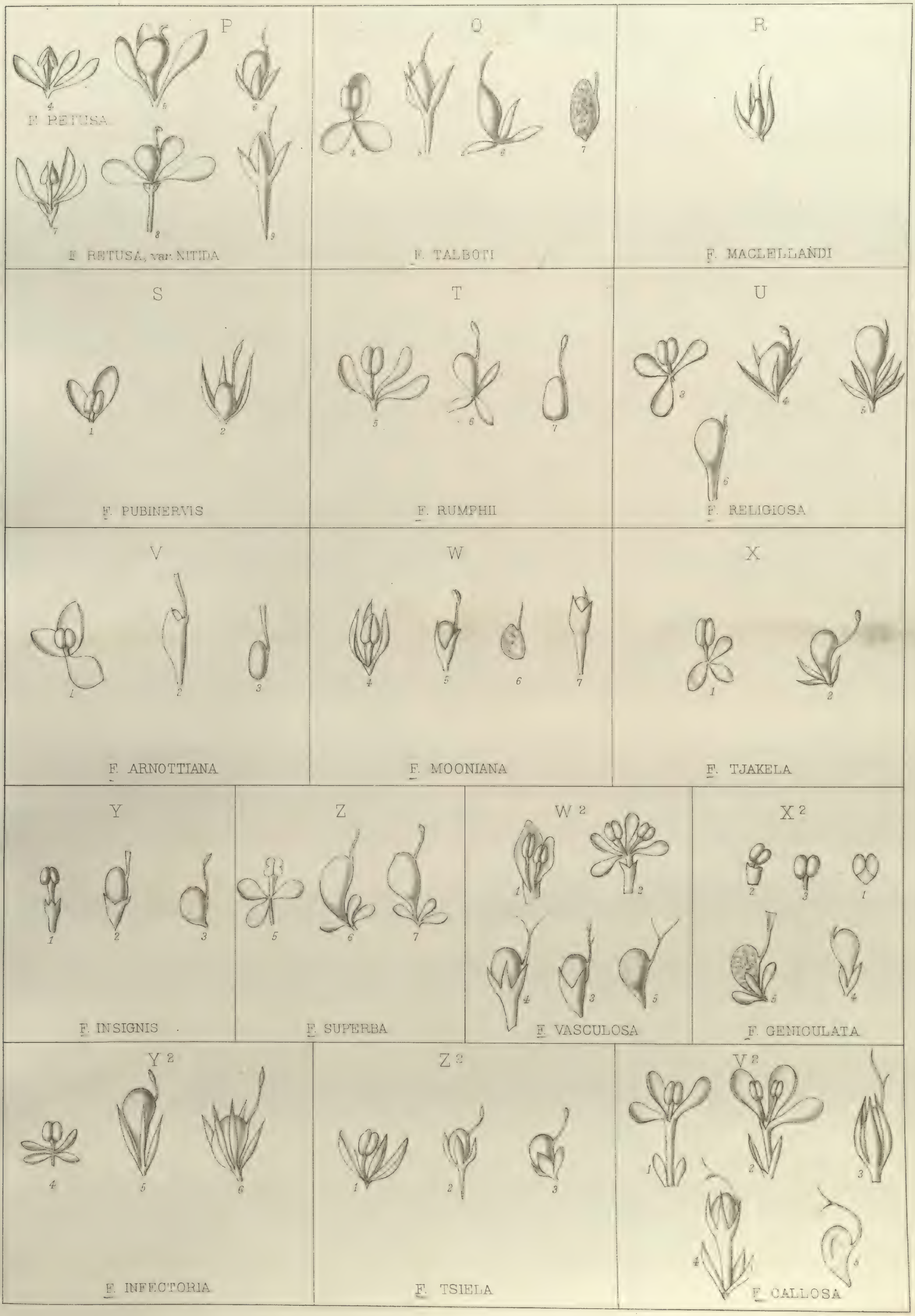
F. PISOCARPA

F. GLABELLA

Lith. at the Survey of India Offices, Calcutta, Jan. 1887.

UROSTIGMA

PLATE 84.



F. RETUSA.

F. RETUSA, var. NITIDA

F. TALBOTI

F. MACLELLANDI

F. PUBINERVIS

F. RUMPHII

F. RELIGIOSA

F. ARNOTTIANA

F. MOONIANA

F. TJAKELA

F. INSIGNIS

F. SUPERBA

F. VASCULOSA

F. GENICULATA

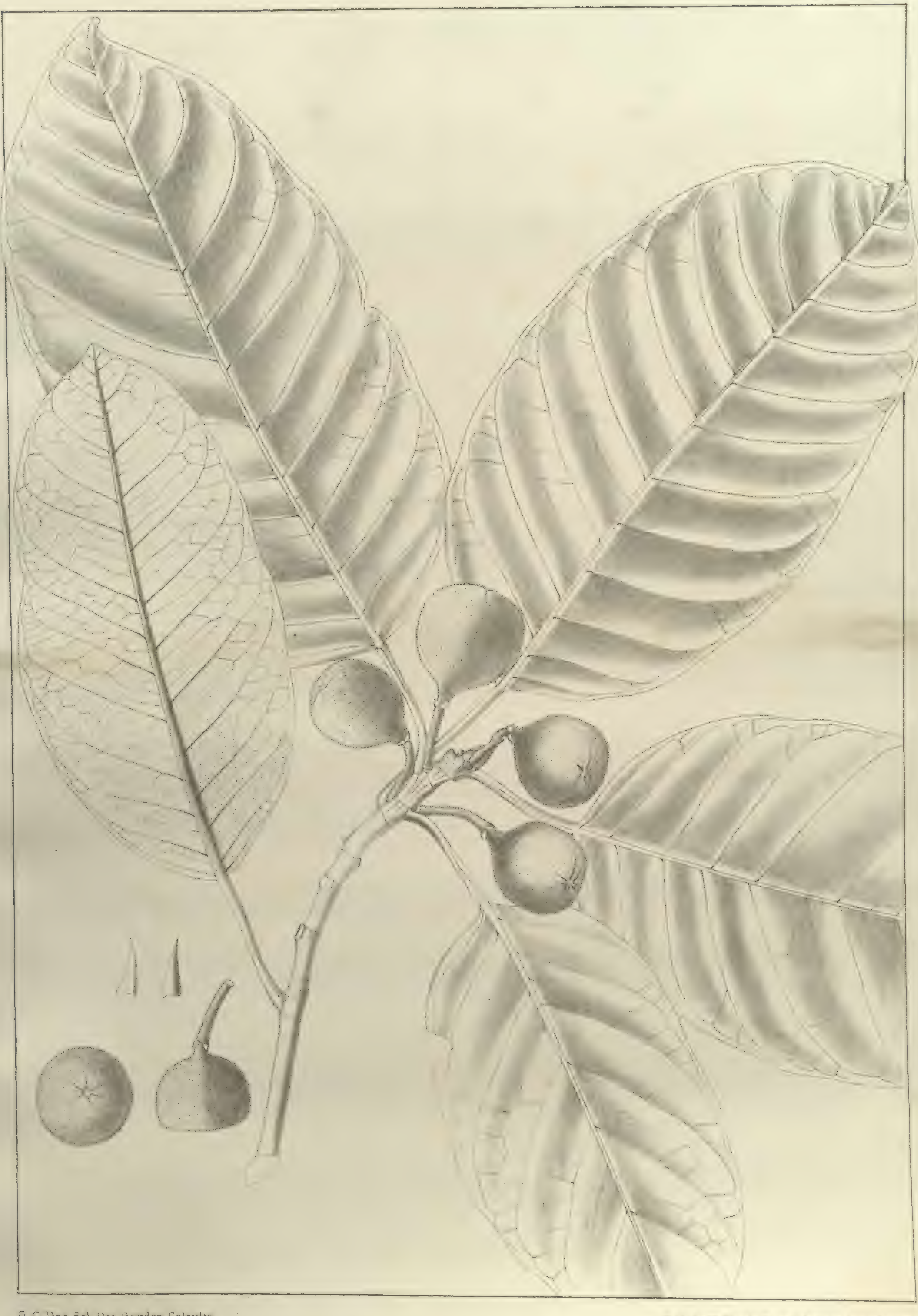
F. INFECTORIA

F. TSIELA

F. CALLOSA

Lith. at the Survey of India Offices, Calcutta, Jan. 1887

UROSTIGMA

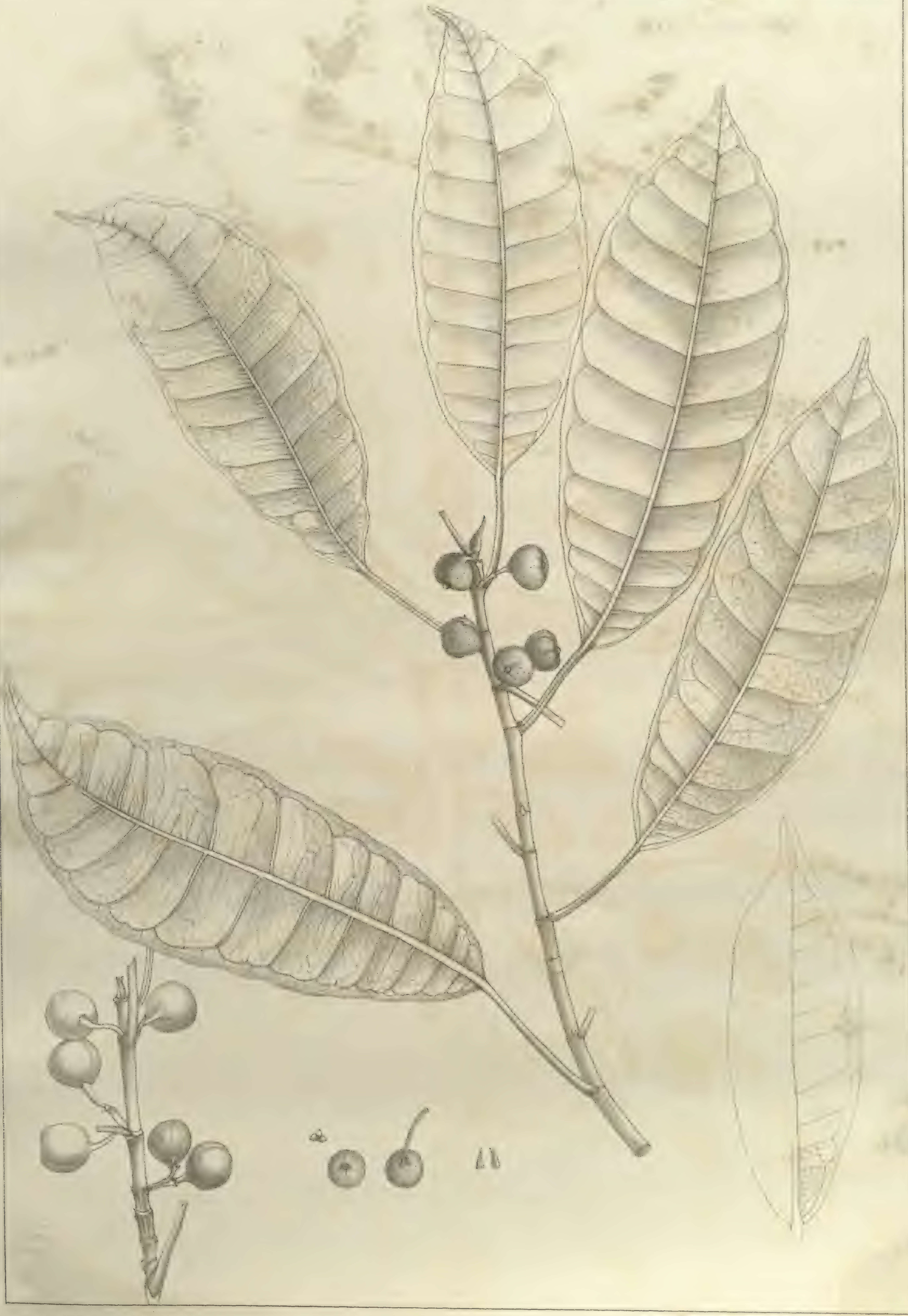


G. C. Das del. Bot. Garden Calcutta.

Lith: by D. Neogy Govt. School of Art Calcutta.
W. Newman & Co Ld Imp.

FICUS CALLOSA, ~~Willd.~~ Willd.

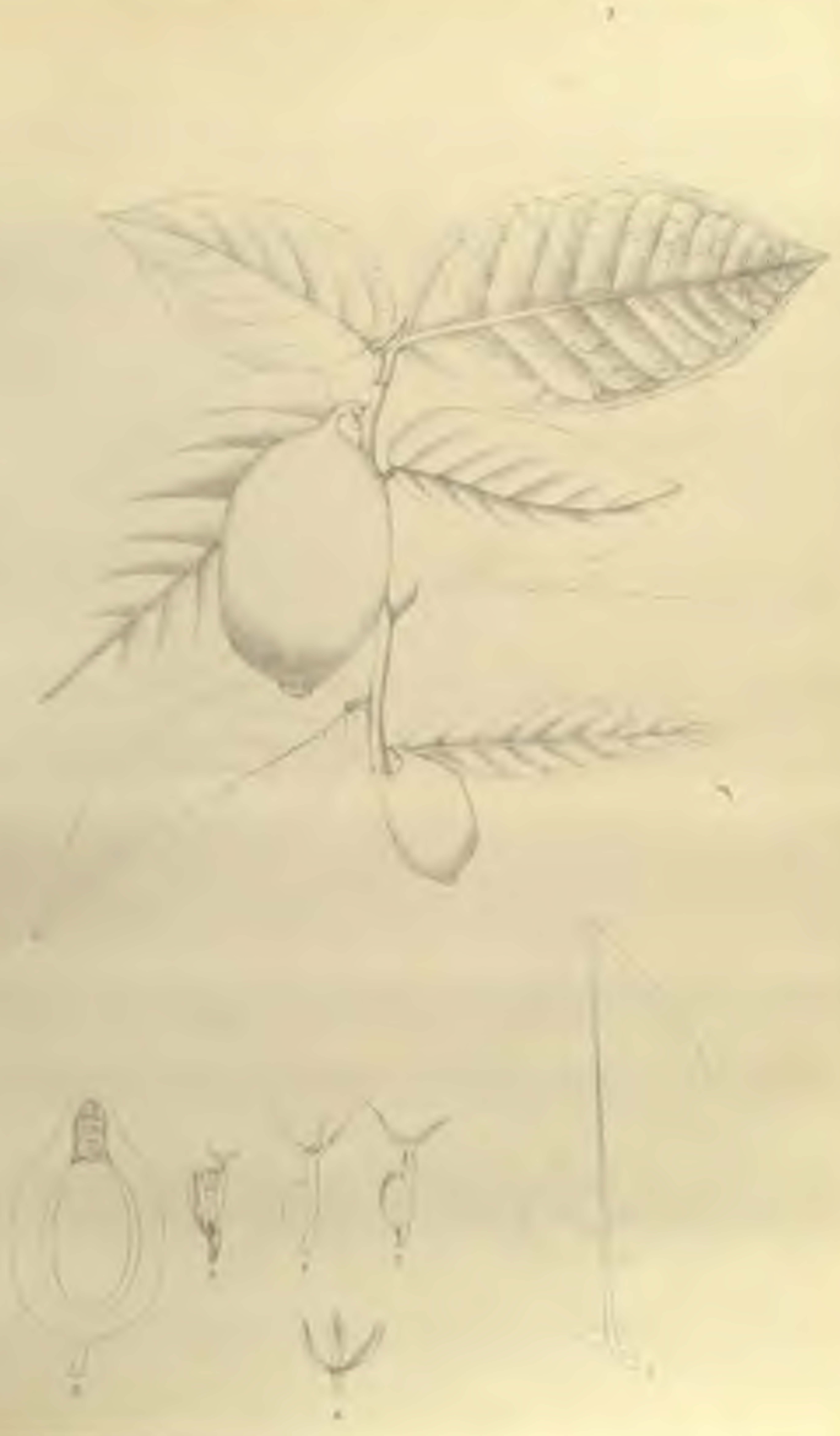
PLATE 86



G. C. Das del. Bot. Garden Calcutta.

Lith. by H. L. Pal Govt. School of Art Calcutta.
W. Newman & Co. imp.

FICUS VASCULOSA, Wall.

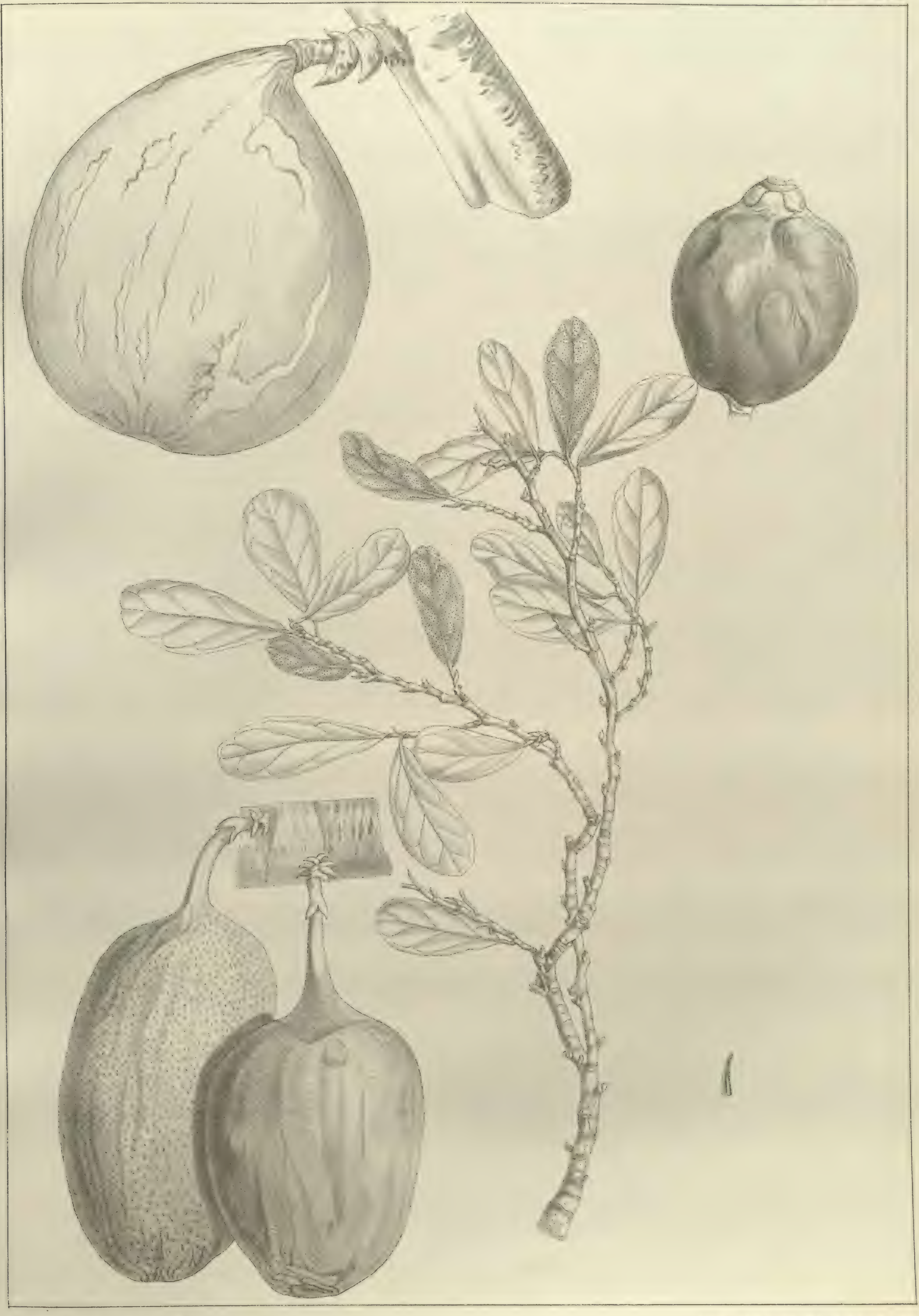


[illegible]

FICUS AURANTIACA, Griff.

[illegible]

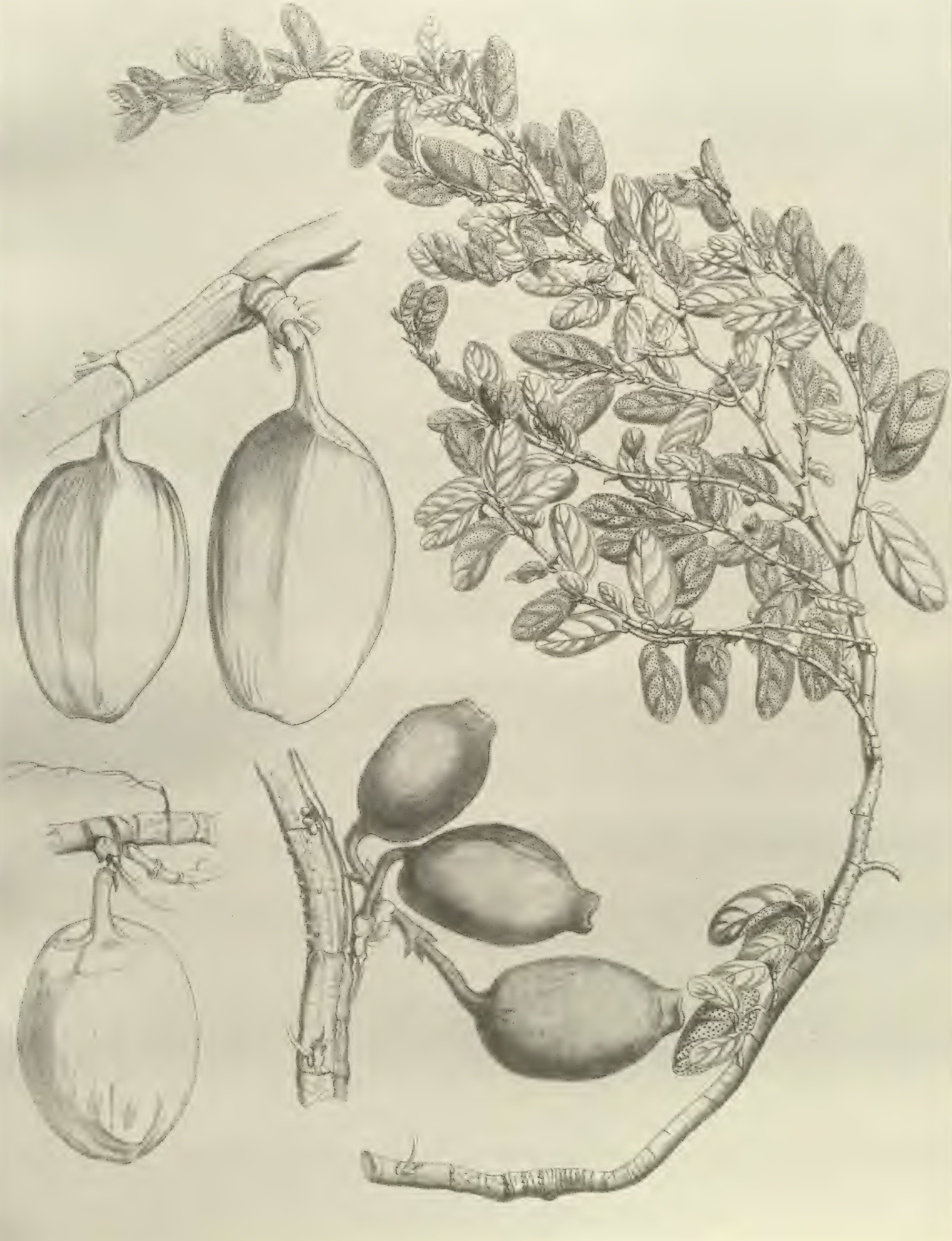
PLATE. ~~CXLVI~~. 88.



G. C. Das del: Bot: Garden Calcutta.

Lith: by J. S. Govi: School of Art Calcutta.

FICUS PUNCTATA, Thunbg.

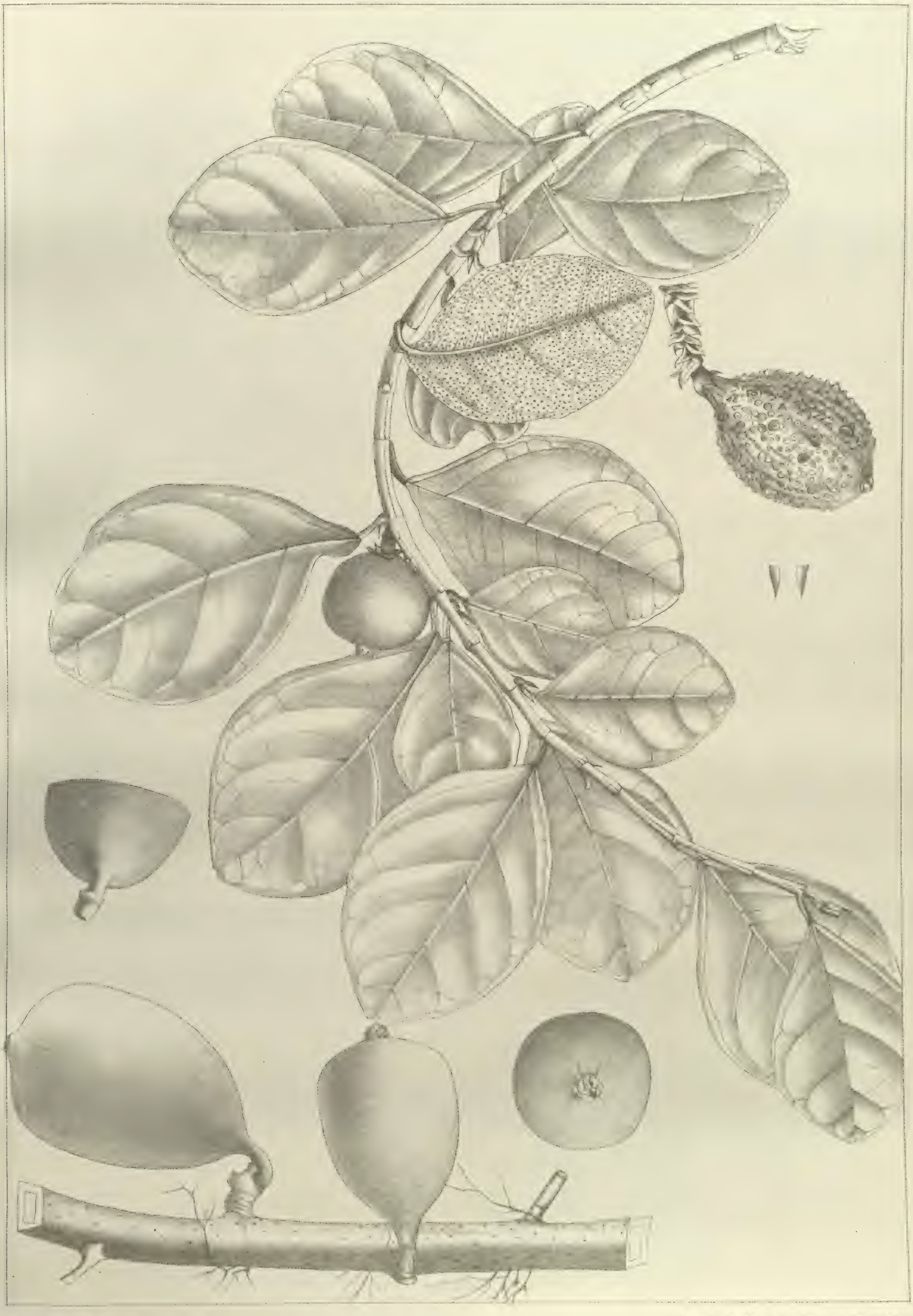


G. C. Das del. Bot. Garden Calcutta.

J. Schaumburg, Lith.
W. Newman & Co. Ld. Imp.

FICUS PUNCTATA, Thunbg. Var. falcata.

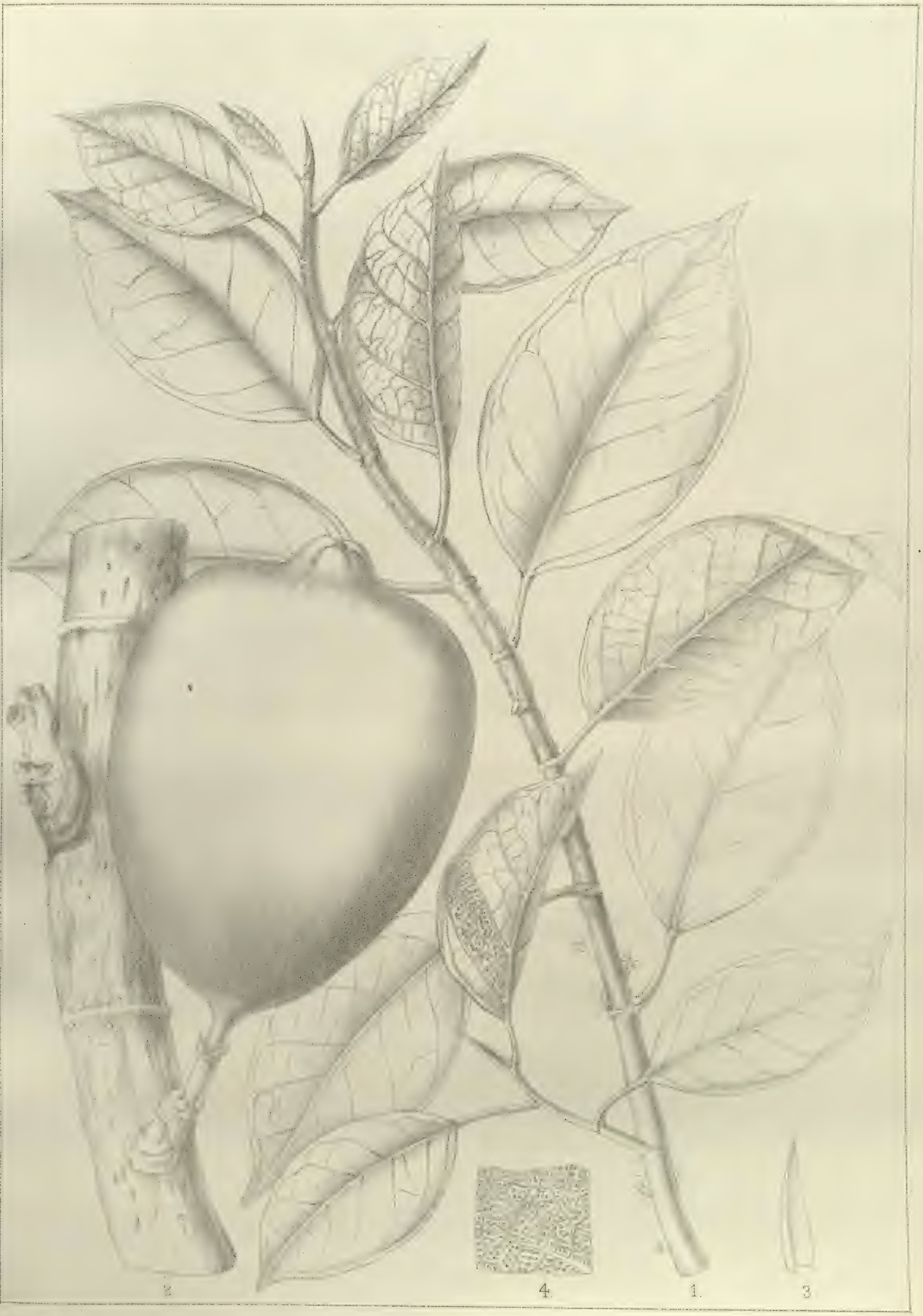
PLATE ~~CXLVII.~~ 90.



G. C. Das del. Bot. Garden Calcutta.

Lith. by D. Neogy Govt. School of Art Calcutta.

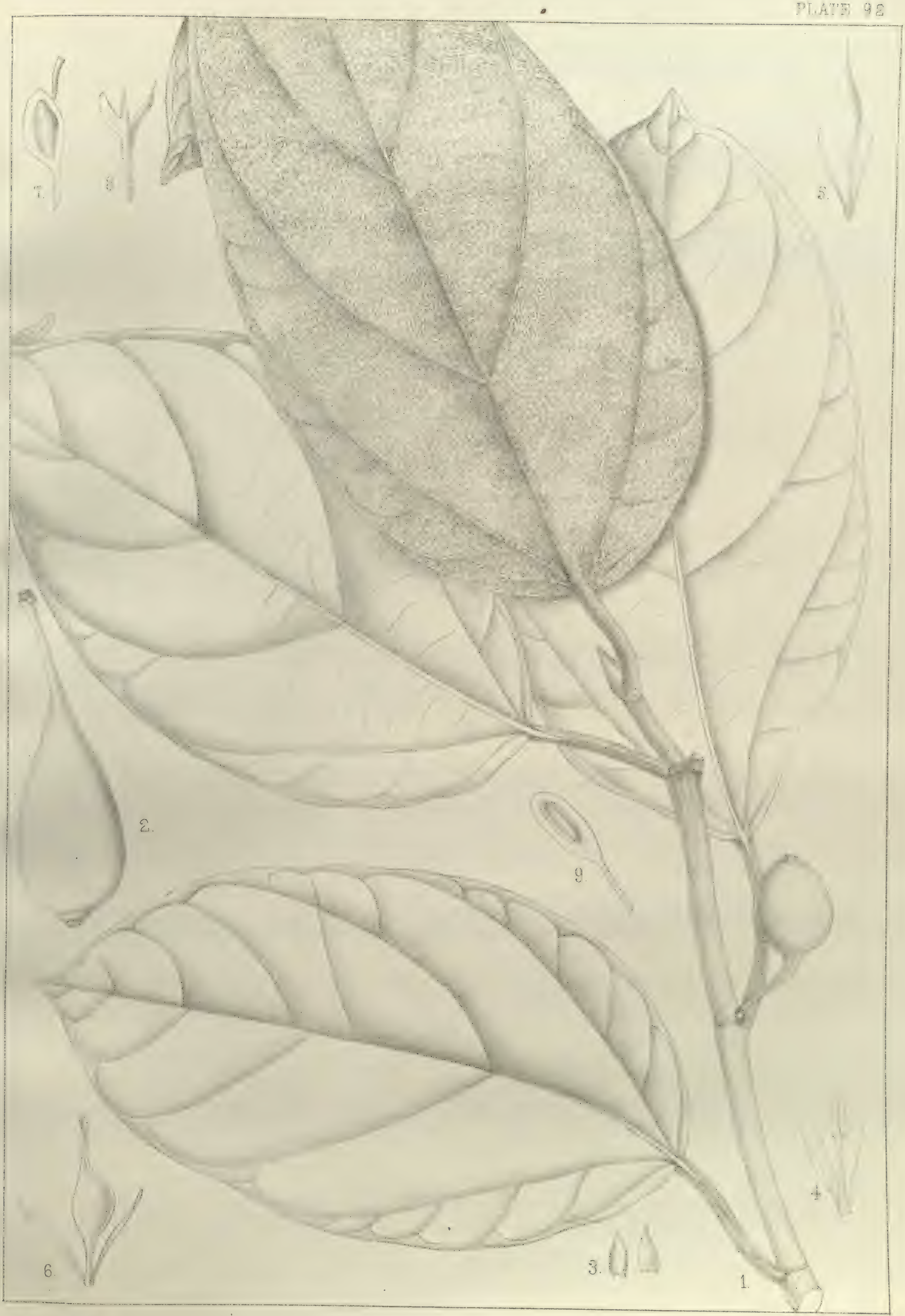
FICUS CALLICARPA, Miq.



M Smith del.

Lith by B. K. Dutt.

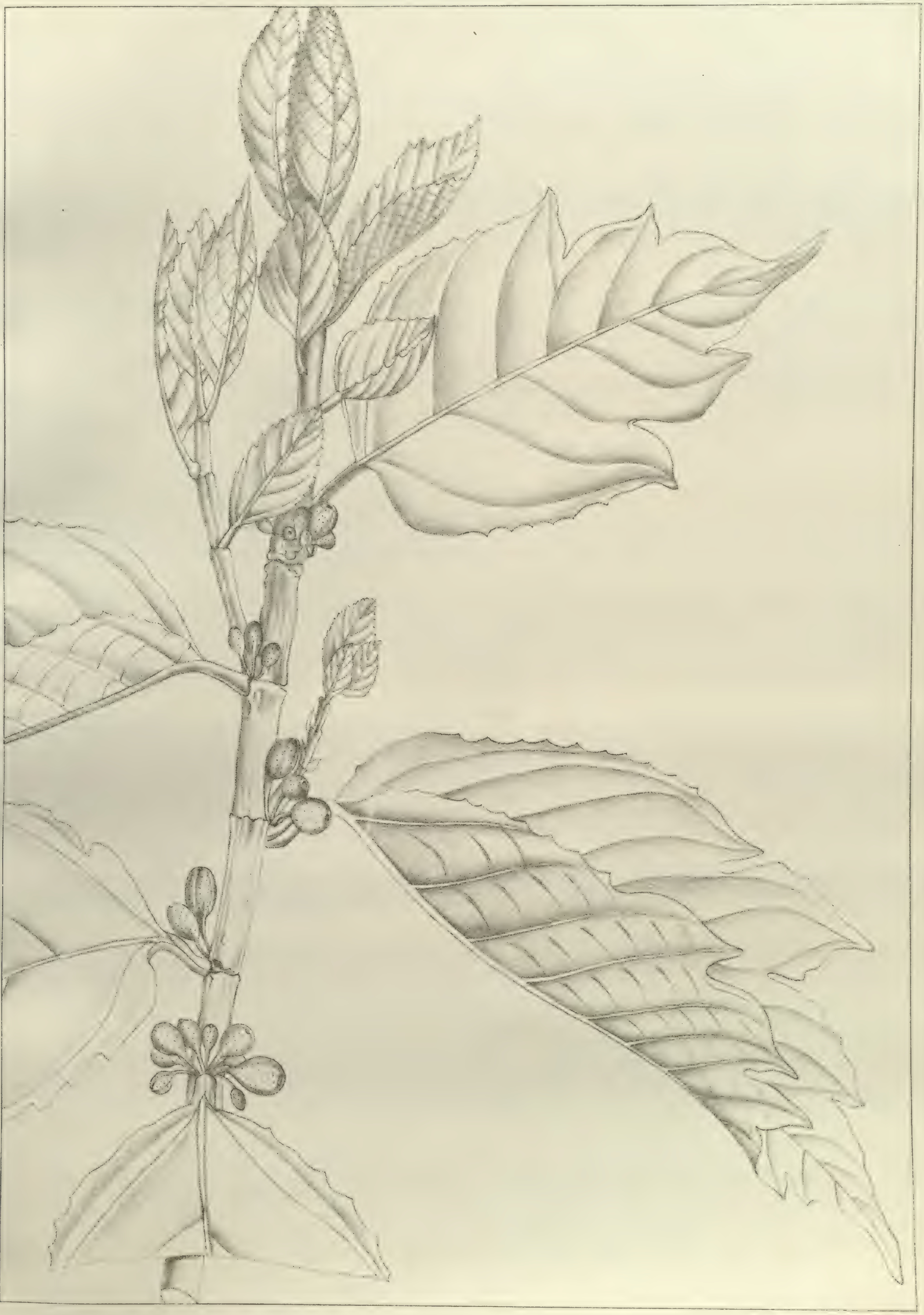
FICUS SINGALANA, King.



G. C. Dass. del.

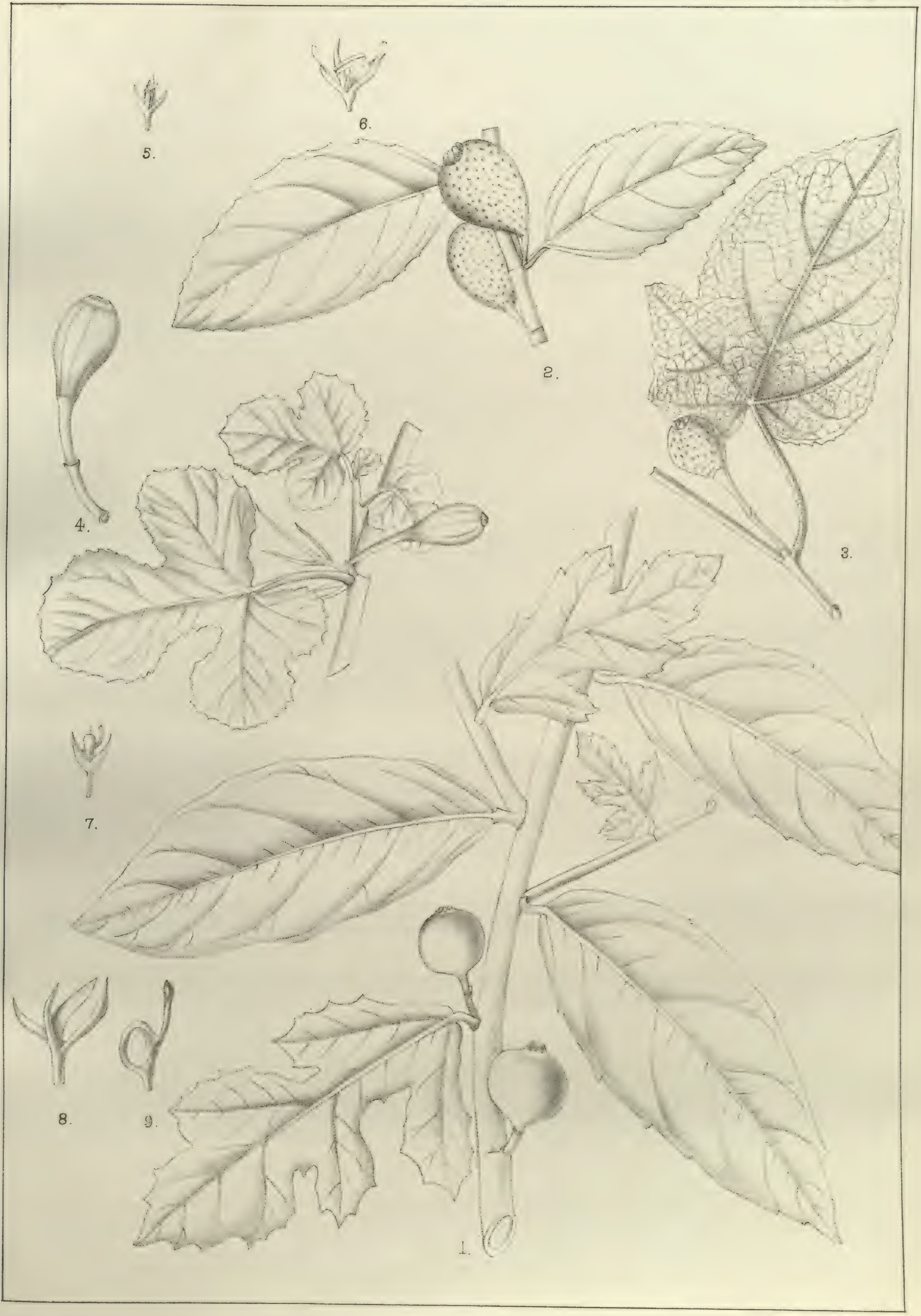
Lith by B. K. Dutta

FICUS APIOCARPA, Miq.



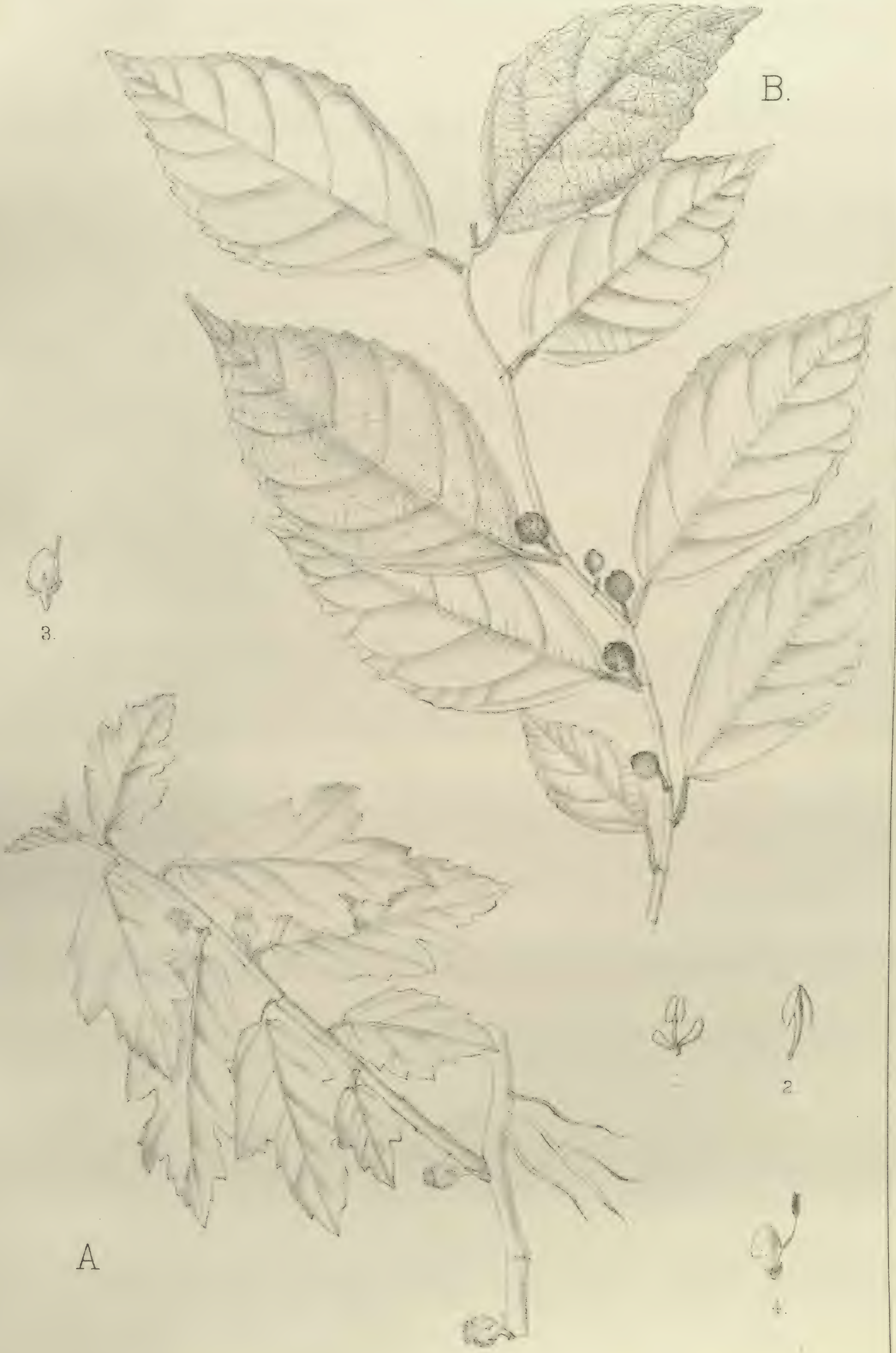
Lith by B.K. Dutta

FICUS PURPURASCENS, Blume.



Lith: by B. K. Dutta.

FICUS HETEROPHYLLA, Linn. Fil.

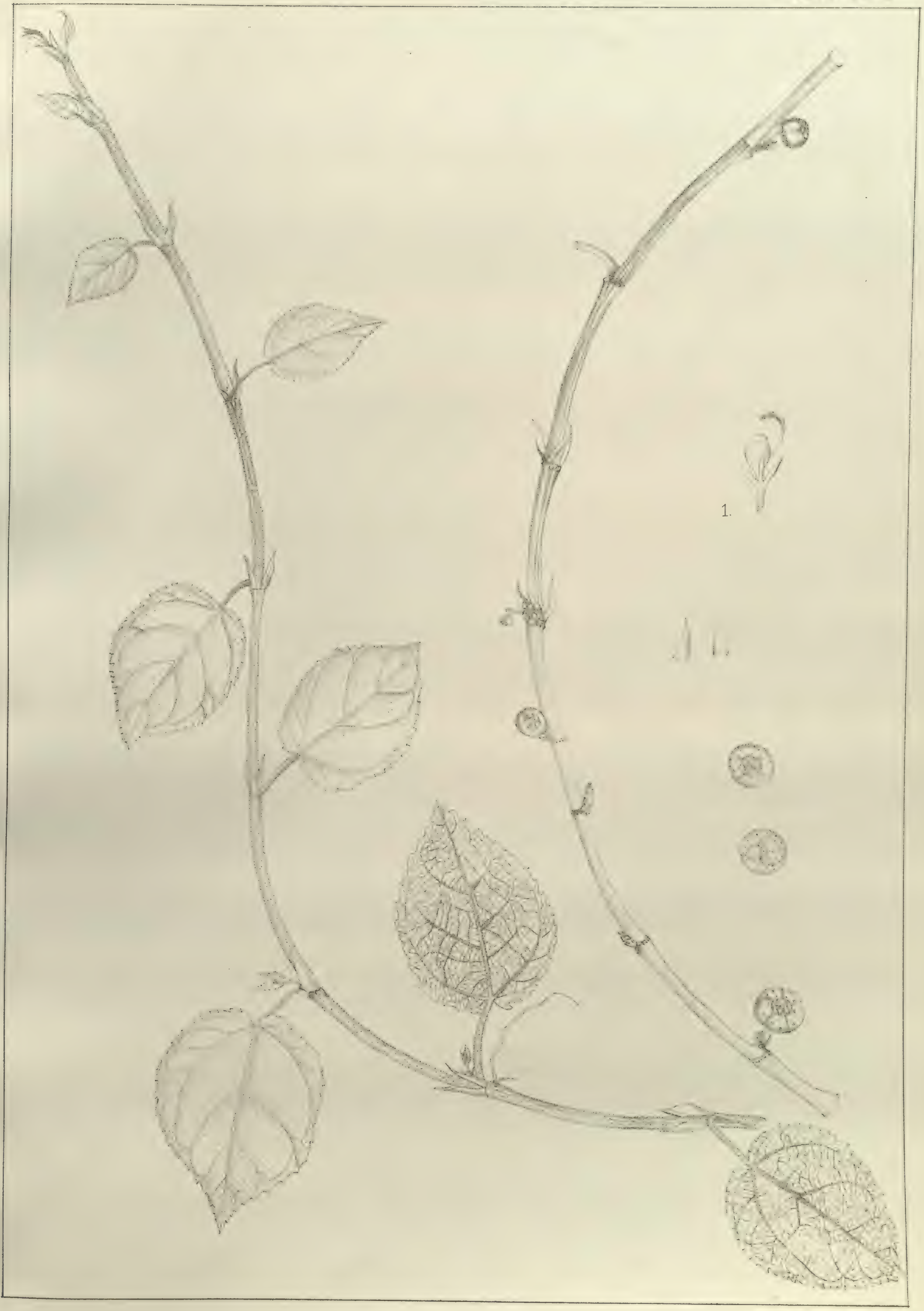


Lith. by B. K. Dutta.

FICUS QUERCIFOLIA, Roxb.

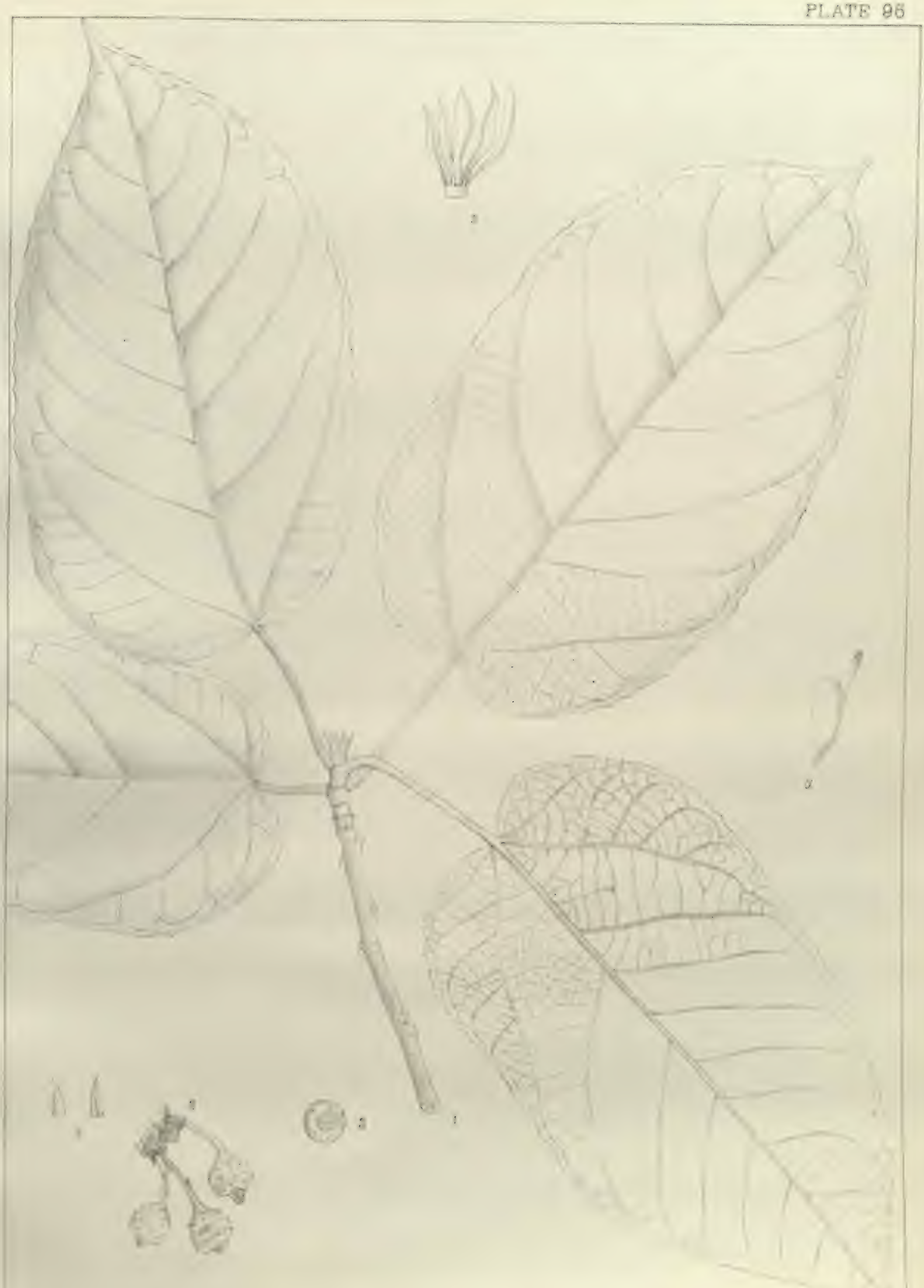
A TYPICAL FORM, B VAR. HUMILIS.

PLATE 95 A



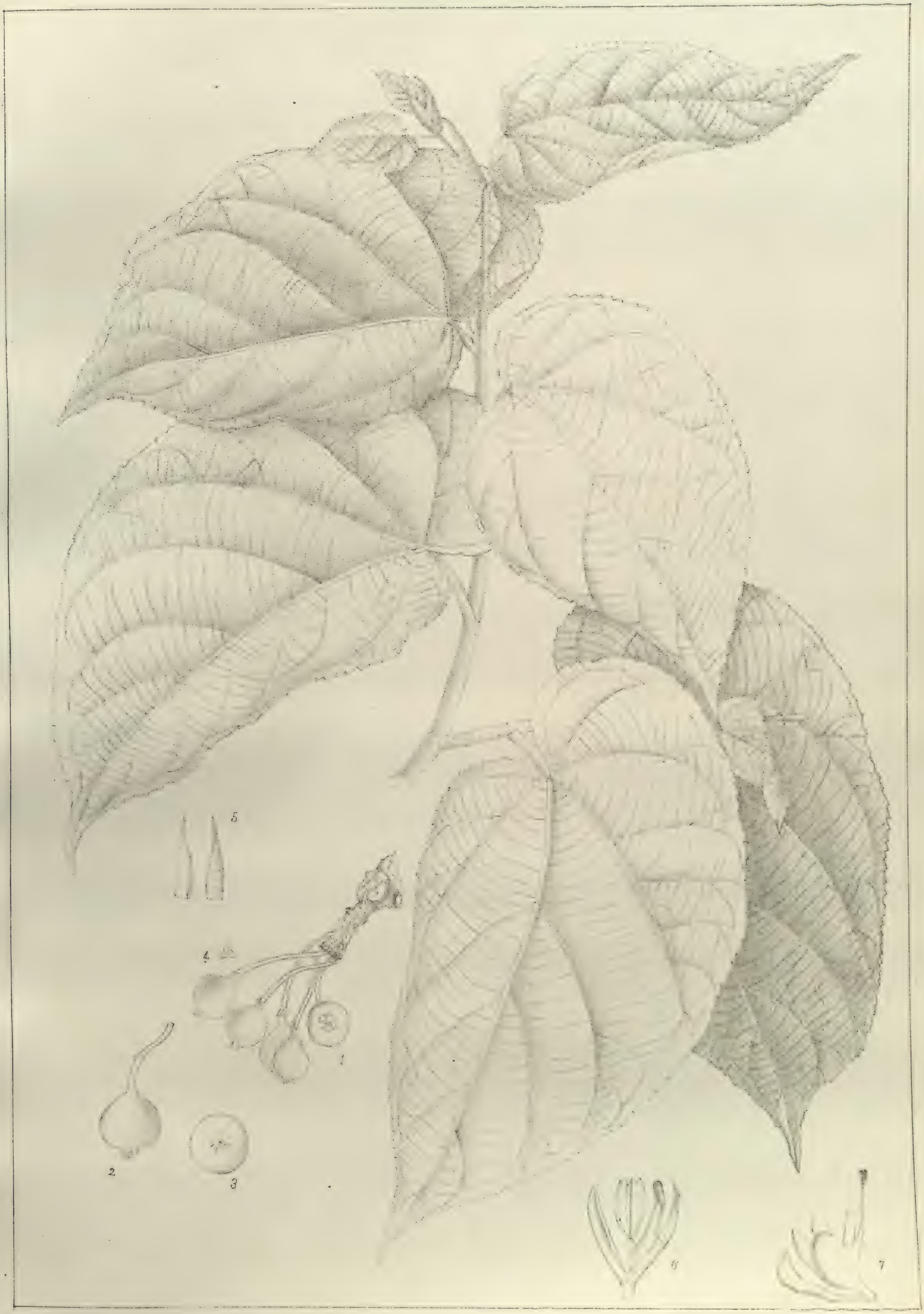
Lith. by B. K. Dutta

FICUS NIGRESCENS, King.



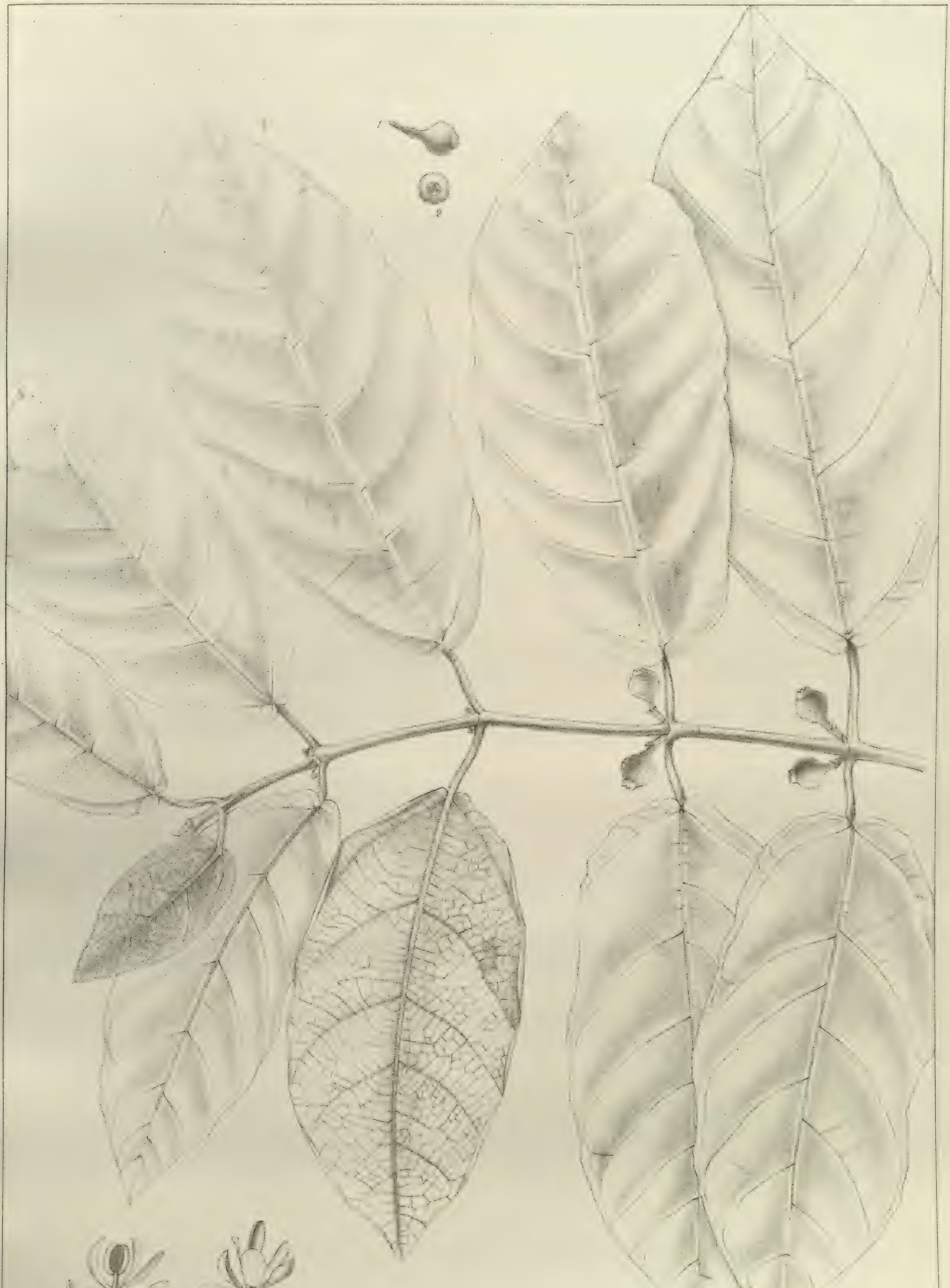
Lith. by B. K. Dutta.

FICUS HETEROPODA, Miq.



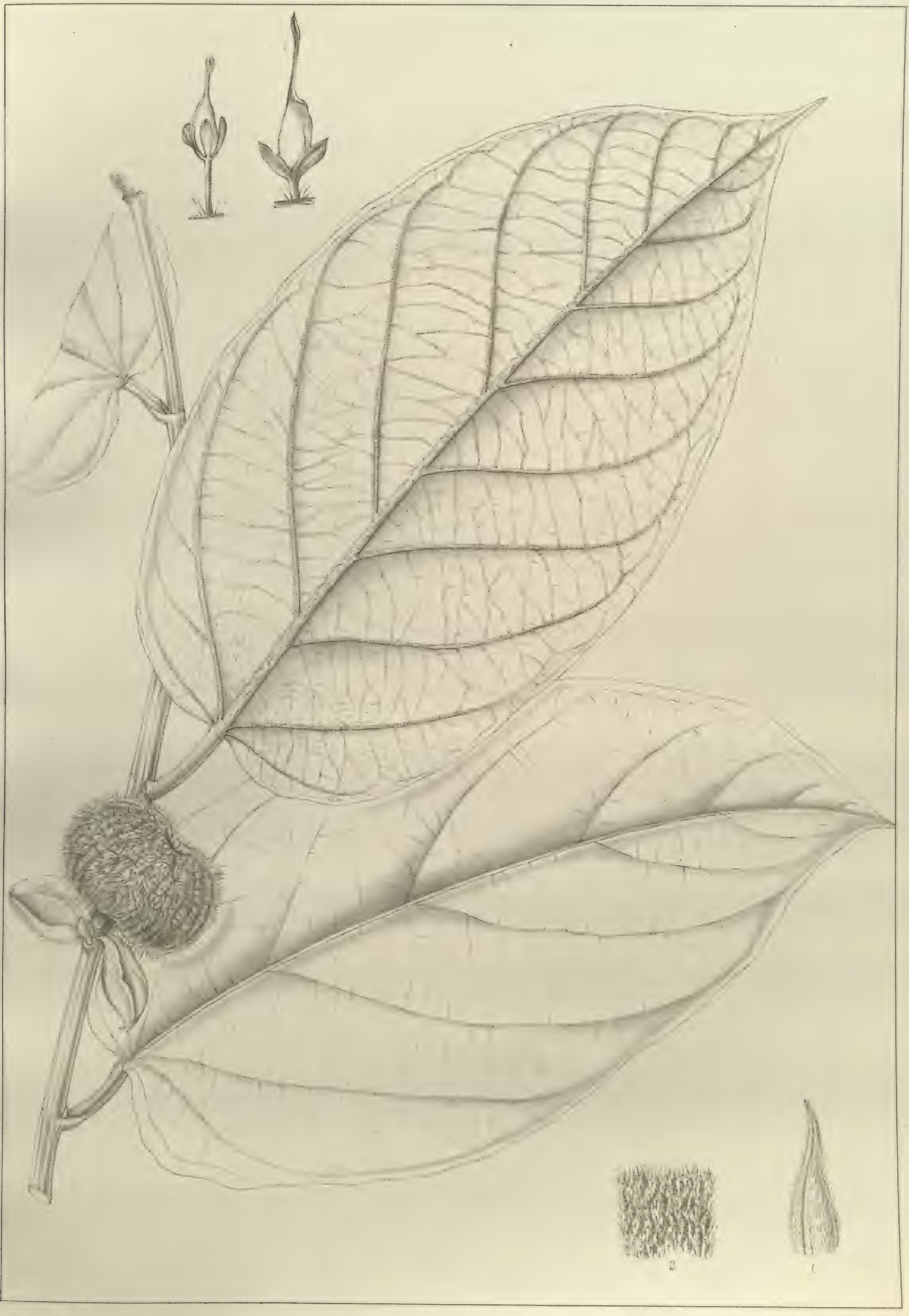
Lith. by B. K. Dutt.

FICUS SEMICORDATA, Miq



Lith. at the Survey of India Offices, Calcutta, March 1887

FICUS CONJUGATA, Miq.

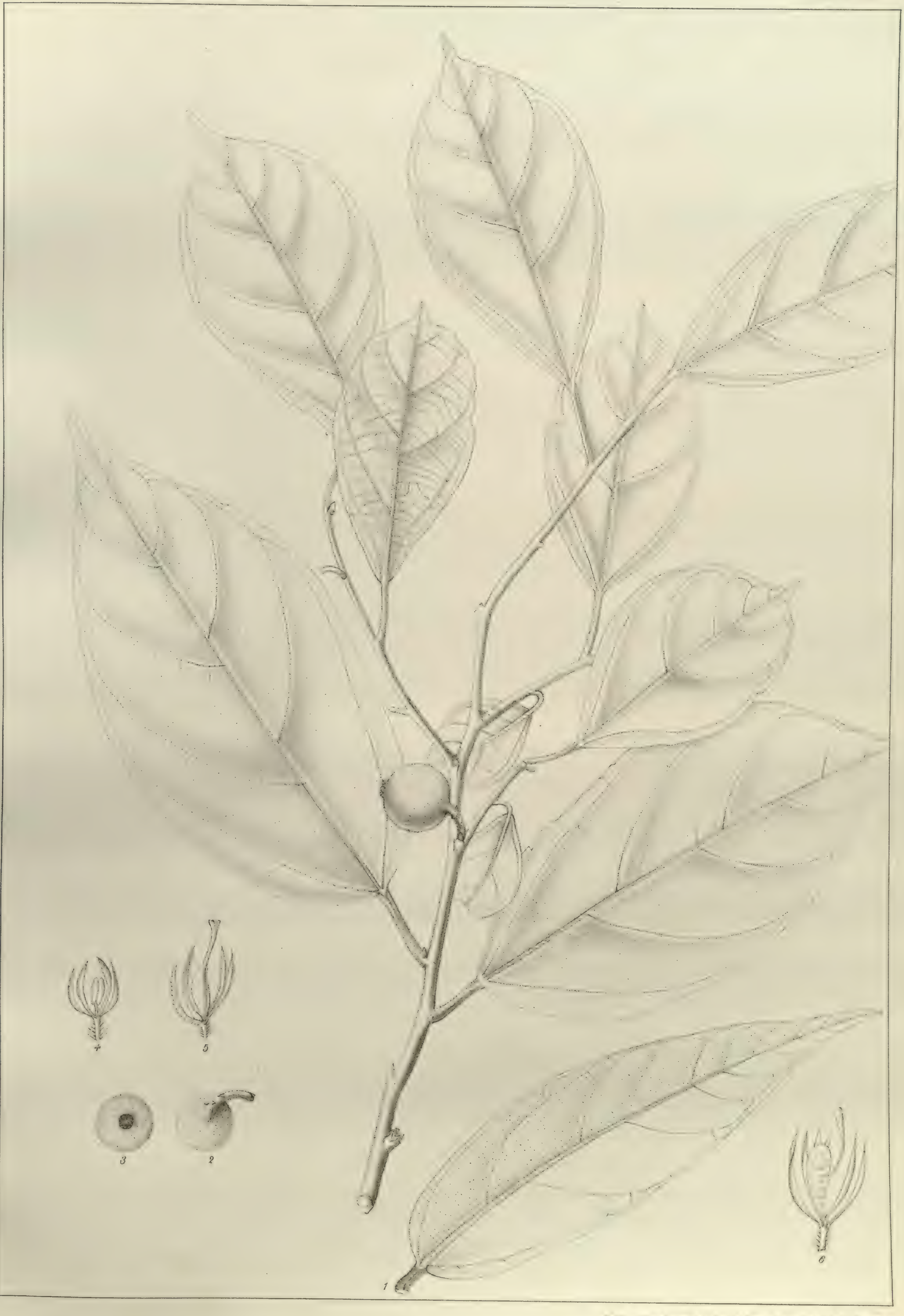


M. Smith, del.

Lith. at the Survey of India Offices, Calcutta, April 1887.

FICUS CONSPICABILIS, King.

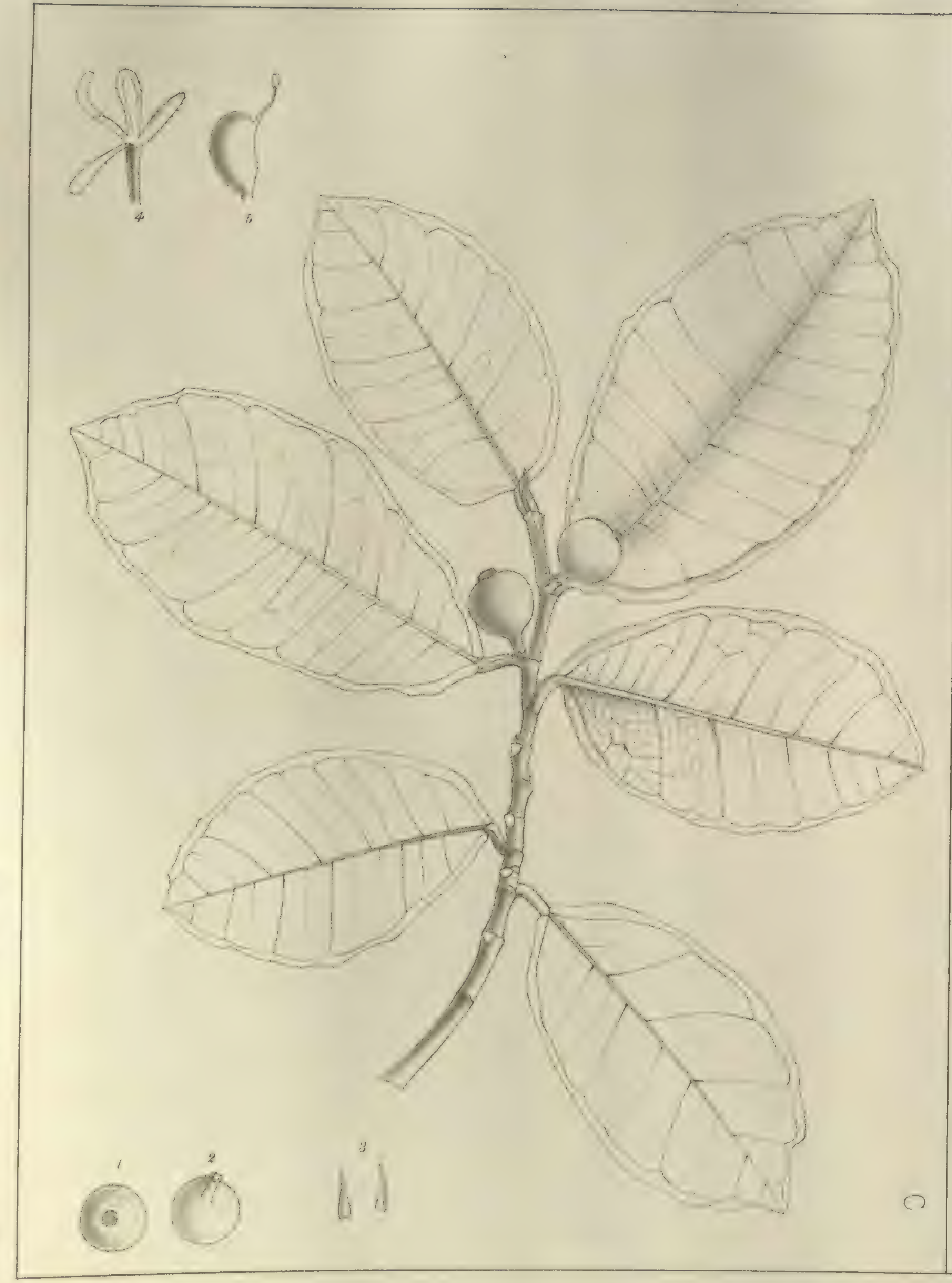
PLATE 100.



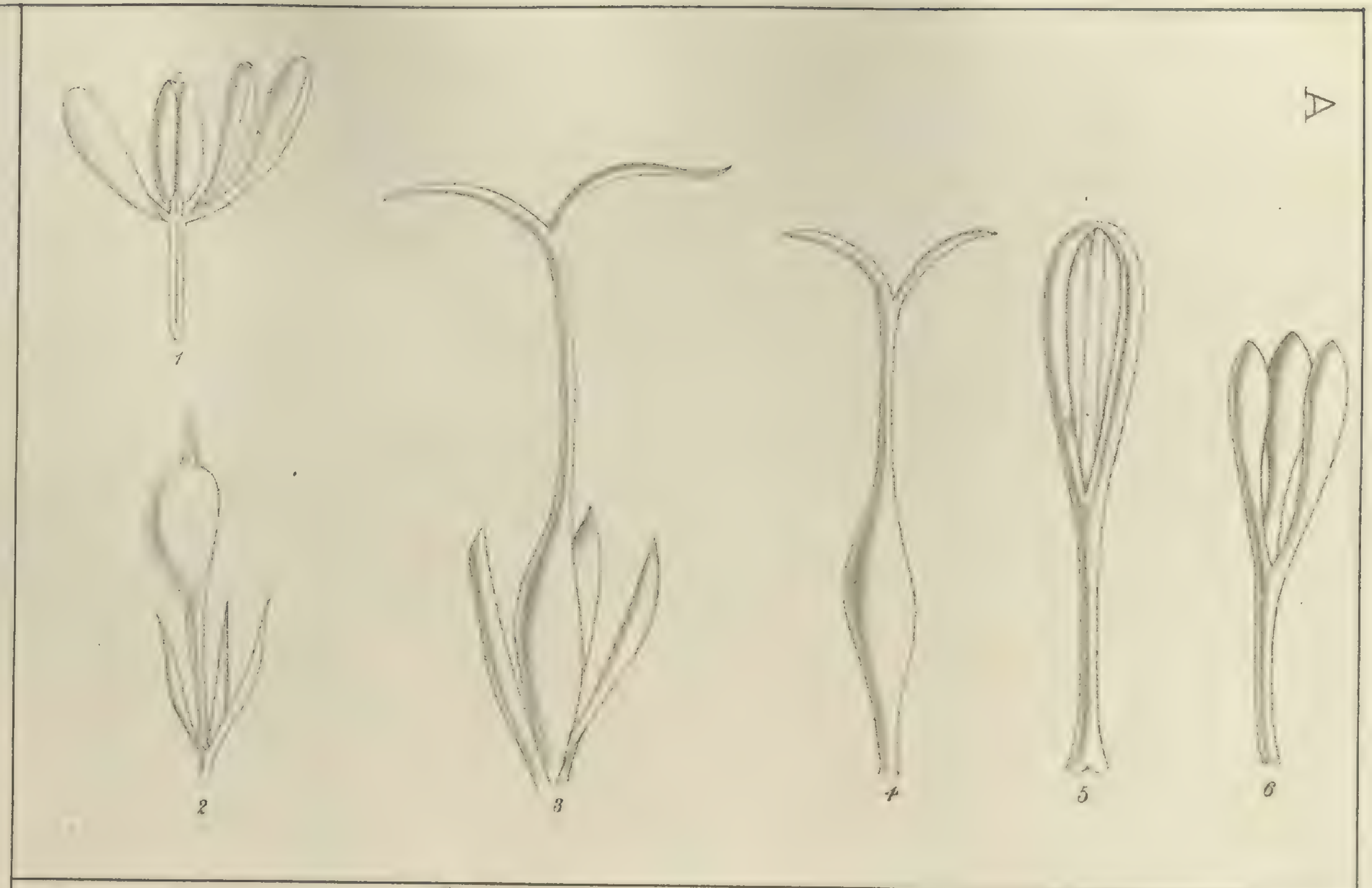
Lith. at the Survey of India Offices, Calcutta, March 1867.

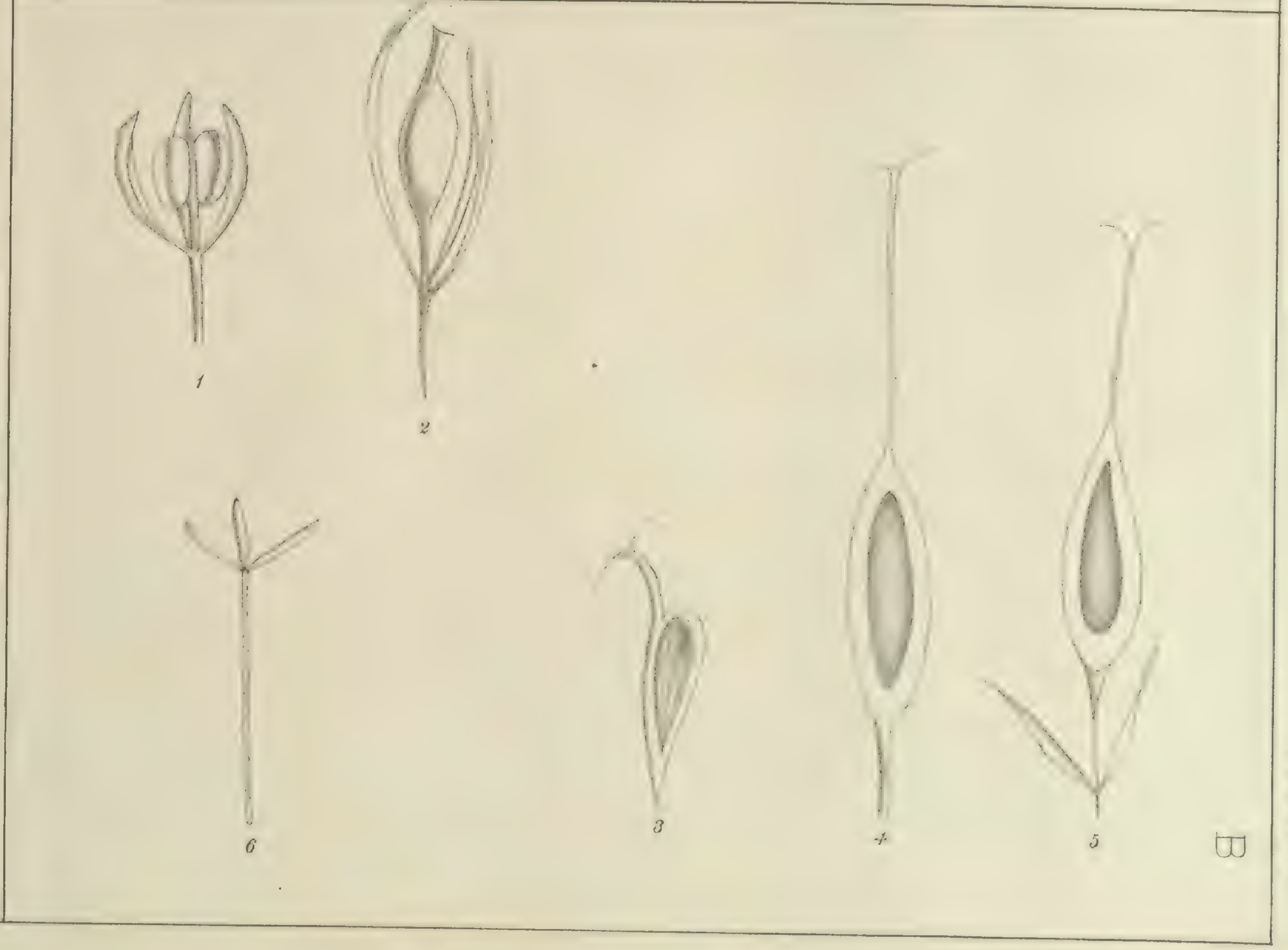
FICUS ASPERRIMA, Roxb.

PLATE 101.



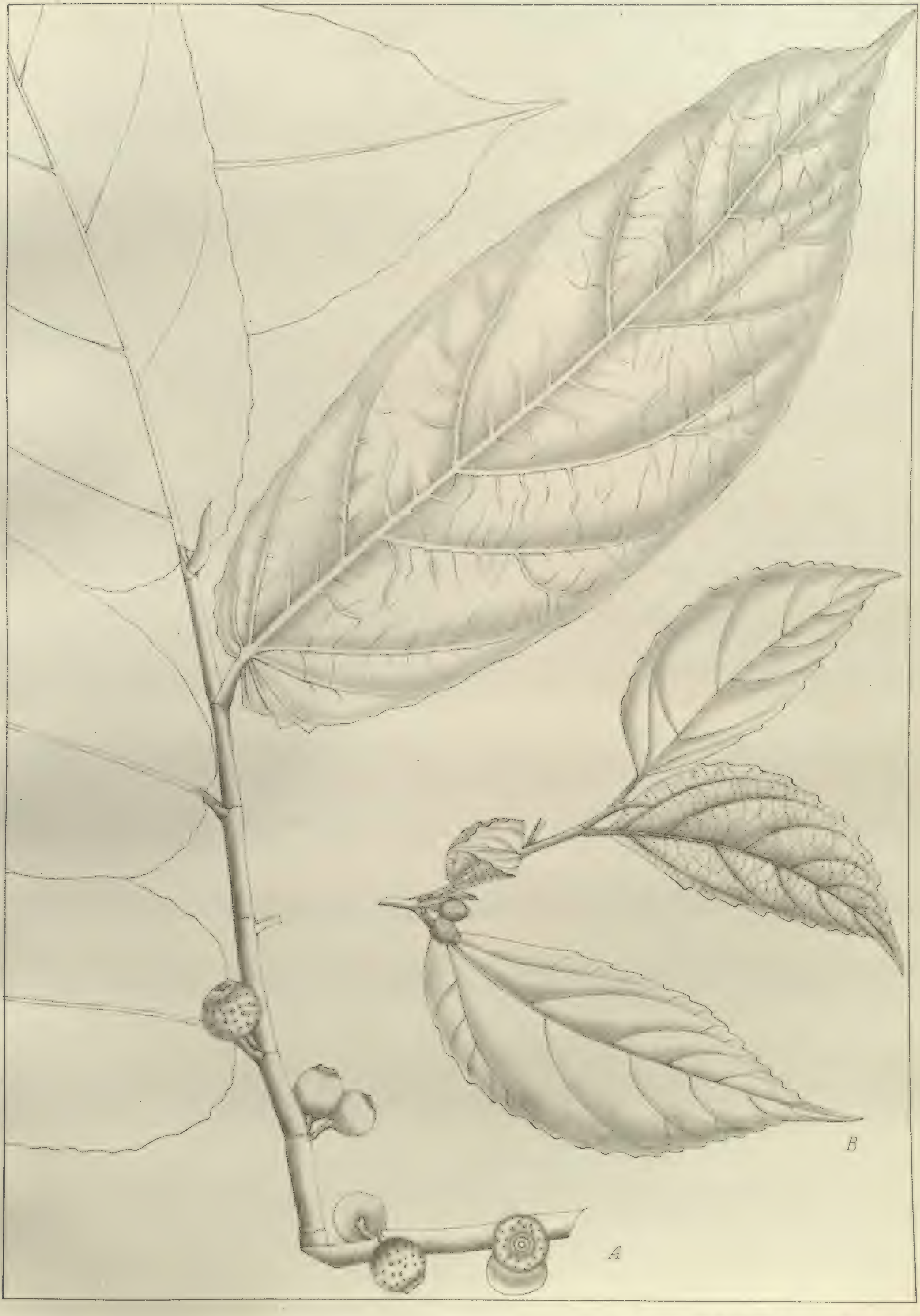
FICUS SWINHOEI, King.





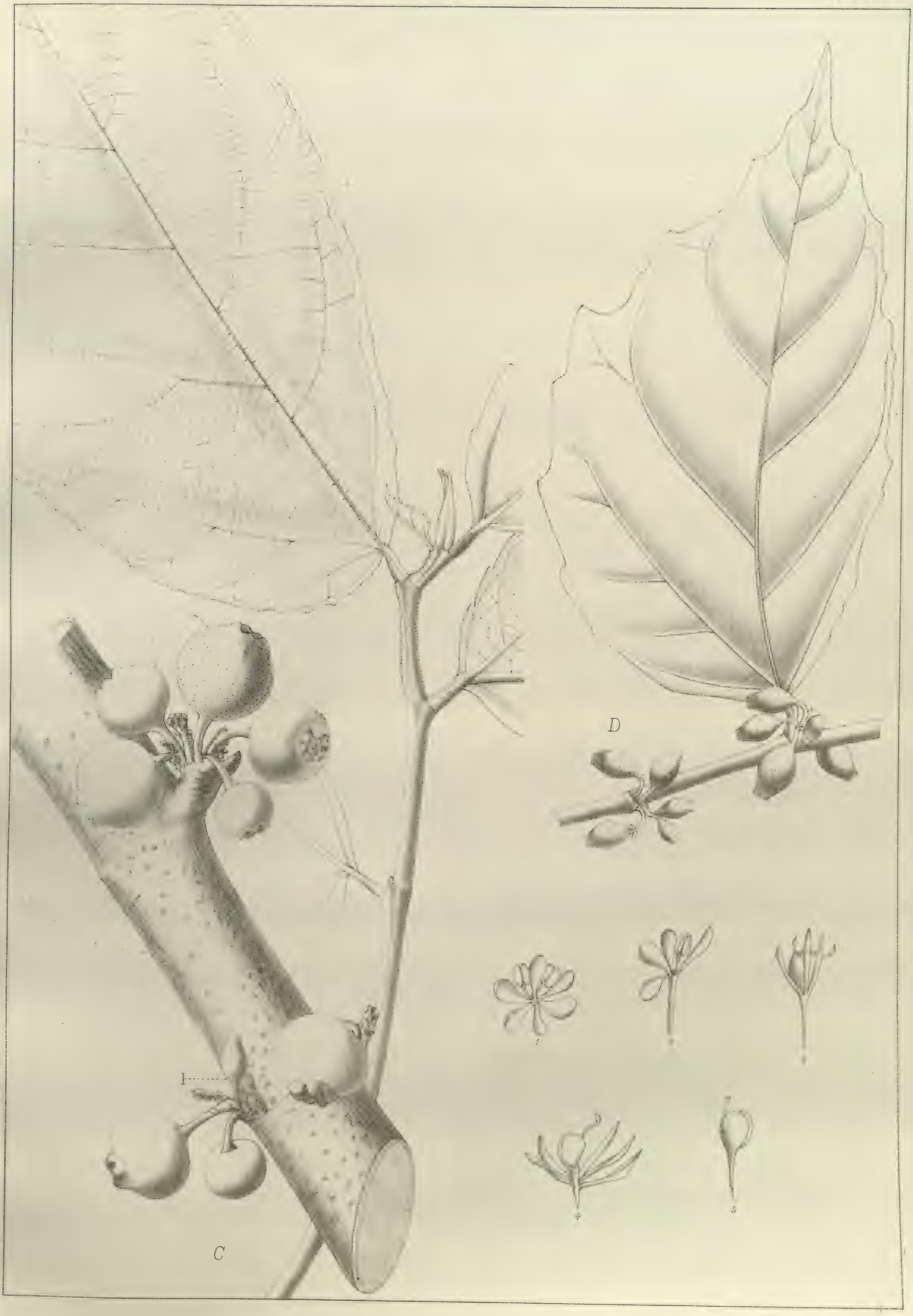
A. FICUS PUNCTATA, Thumb.
B. FICUS CALLICARPA, Miq.

Lith. at the Survey of India Offices, Calcutta, April 1887.



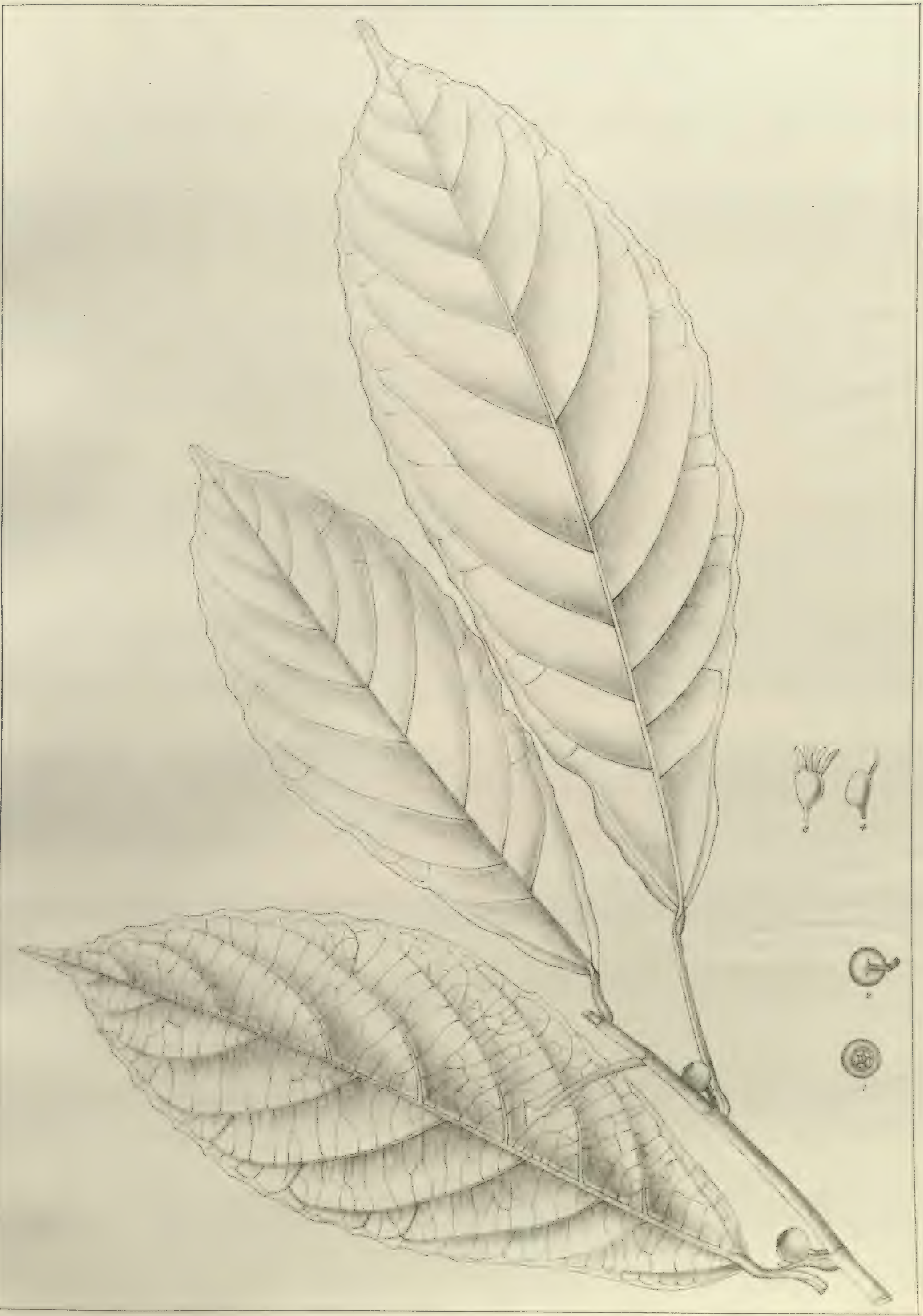
Lith. at the Survey of India Offices, Calcutta, March 1887.

FICUS OBSCURA, Blume.



Lith. at the Survey of India Offices, Calcutta, March 1887

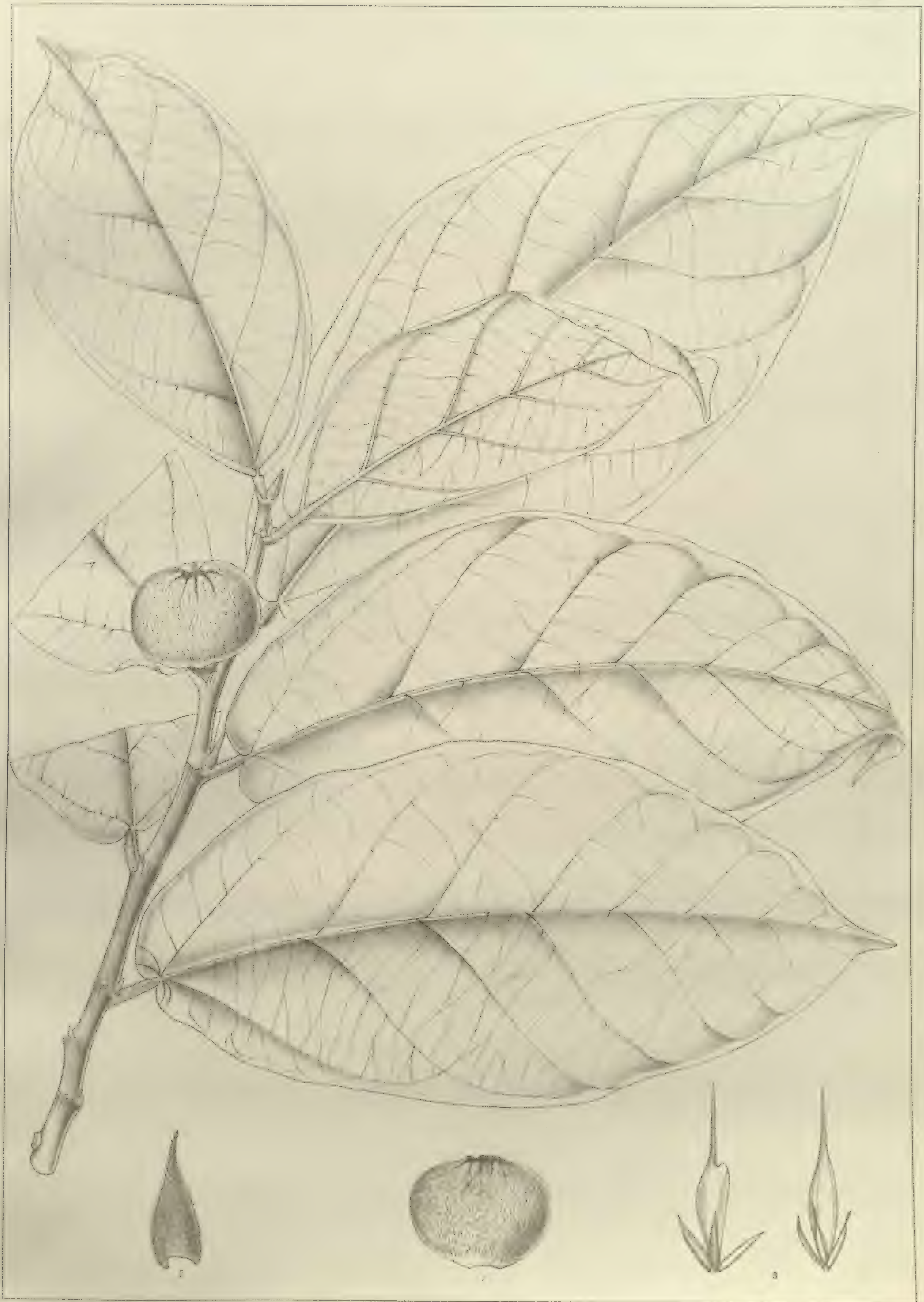
FICUS OBSCURA, Blume.



Lith. at the Survey of India Offices, Calcutta, March 1887

FICUS MADURENSIS, Miq.

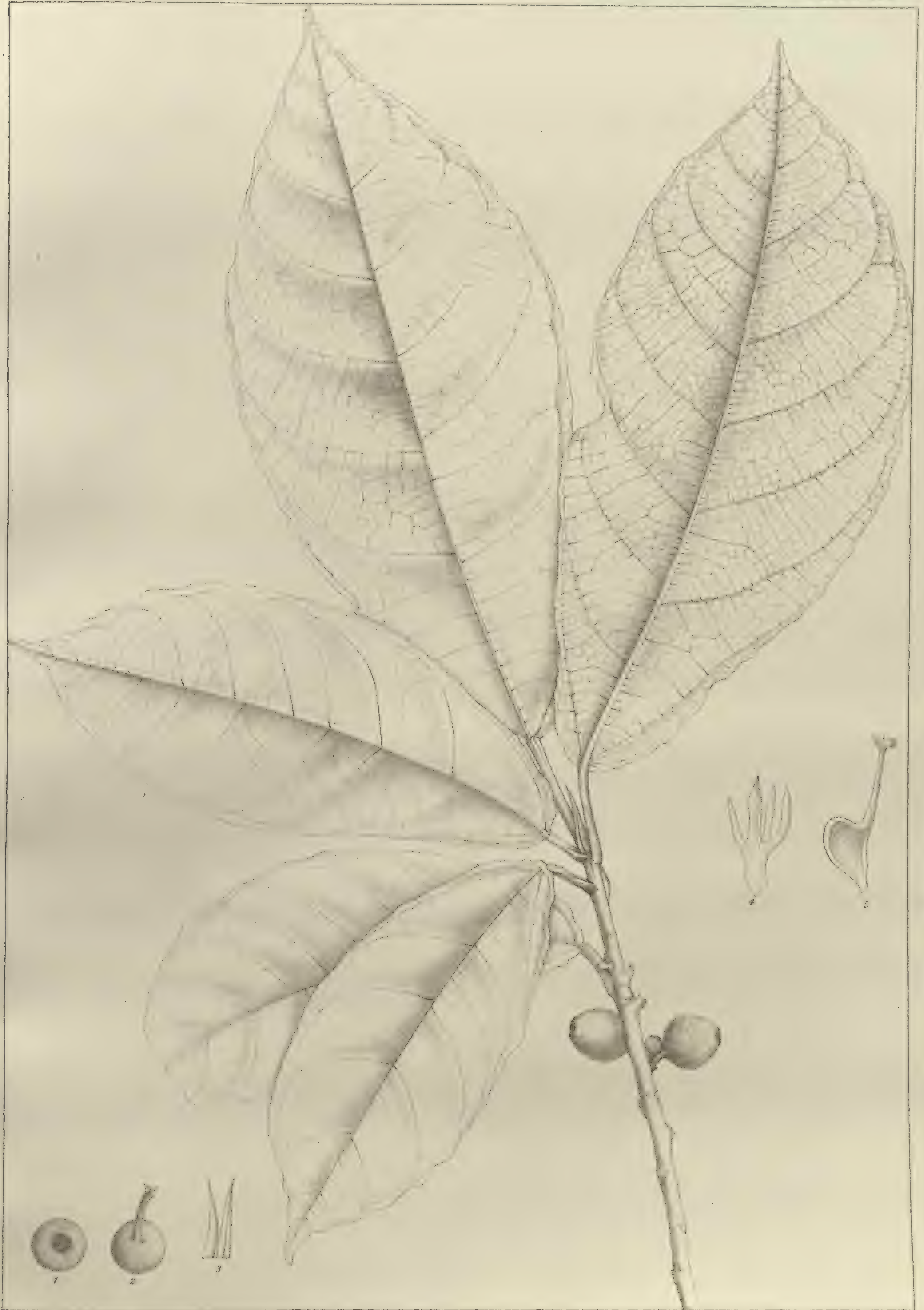
PLATE 105.



M. Smith, del.

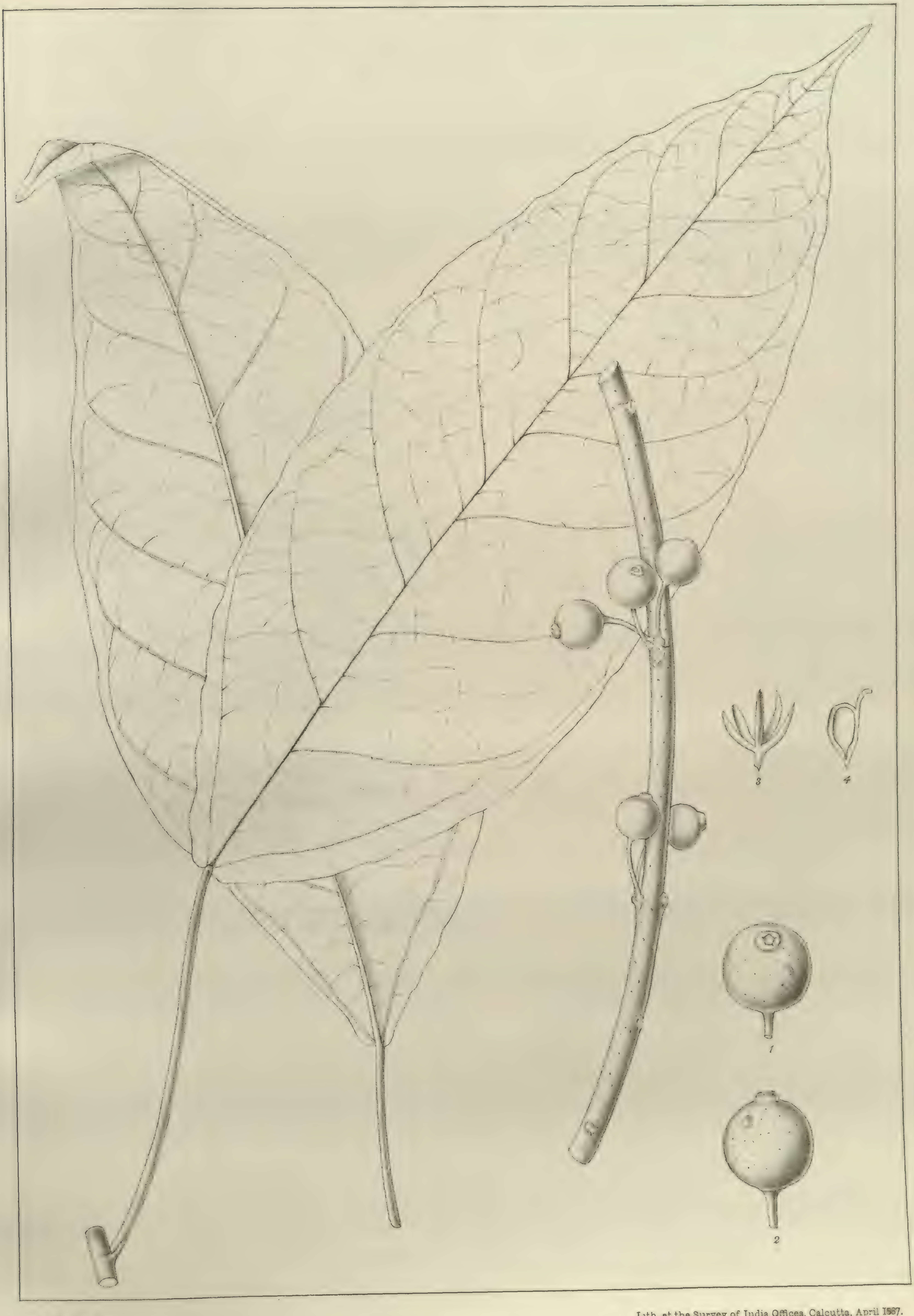
Lith. at the Survey of India Offices, Calcutta, April 1887.

FICUS MESPILOIDES, King



Lith. at the Survey of India Offices, Calcutta, April 1887.

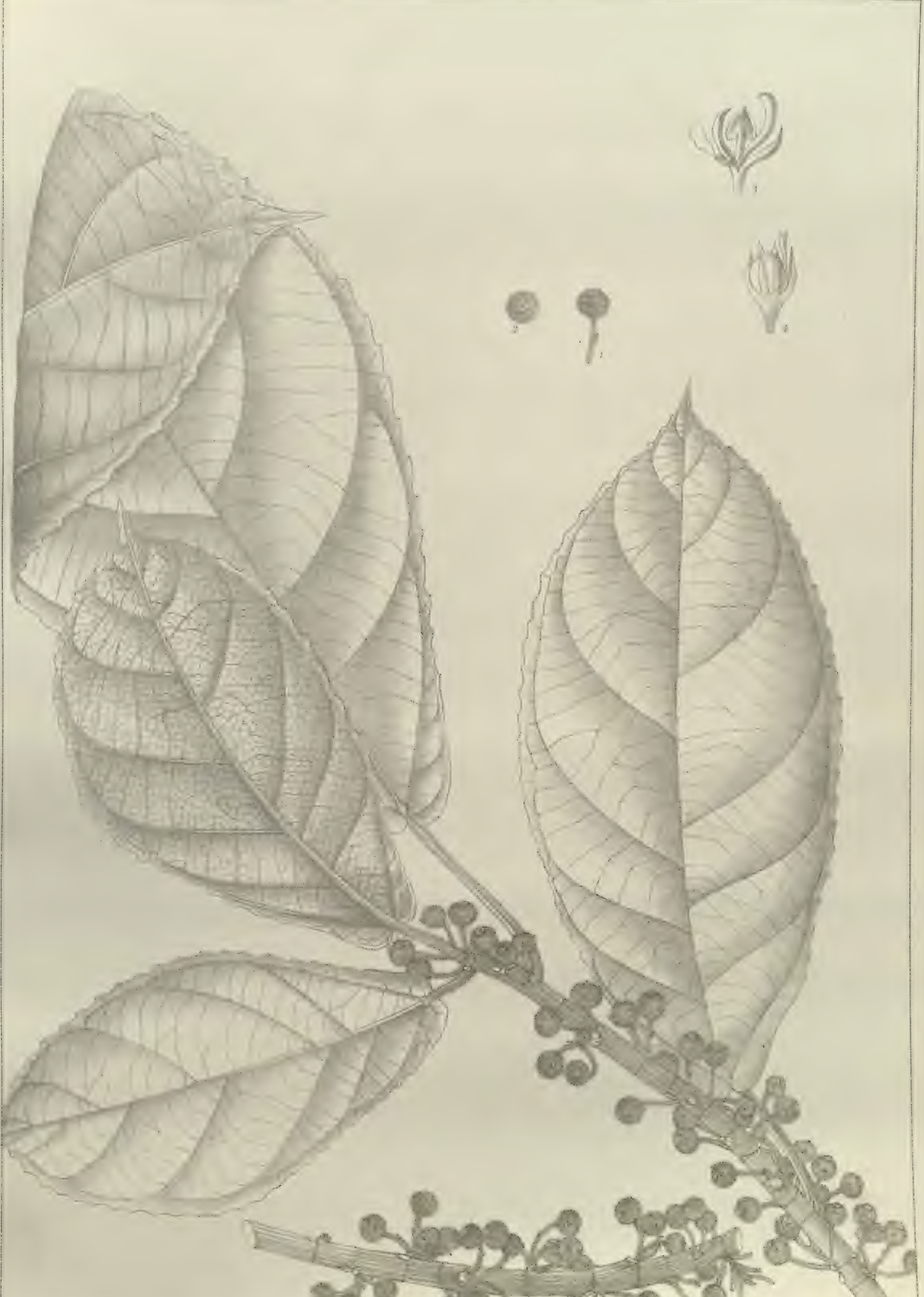
FICUS BREVICUSPIS, Miq.



M. Smith, del.

Lith. at the Survey of India Offices, Calcutta, April 1887.

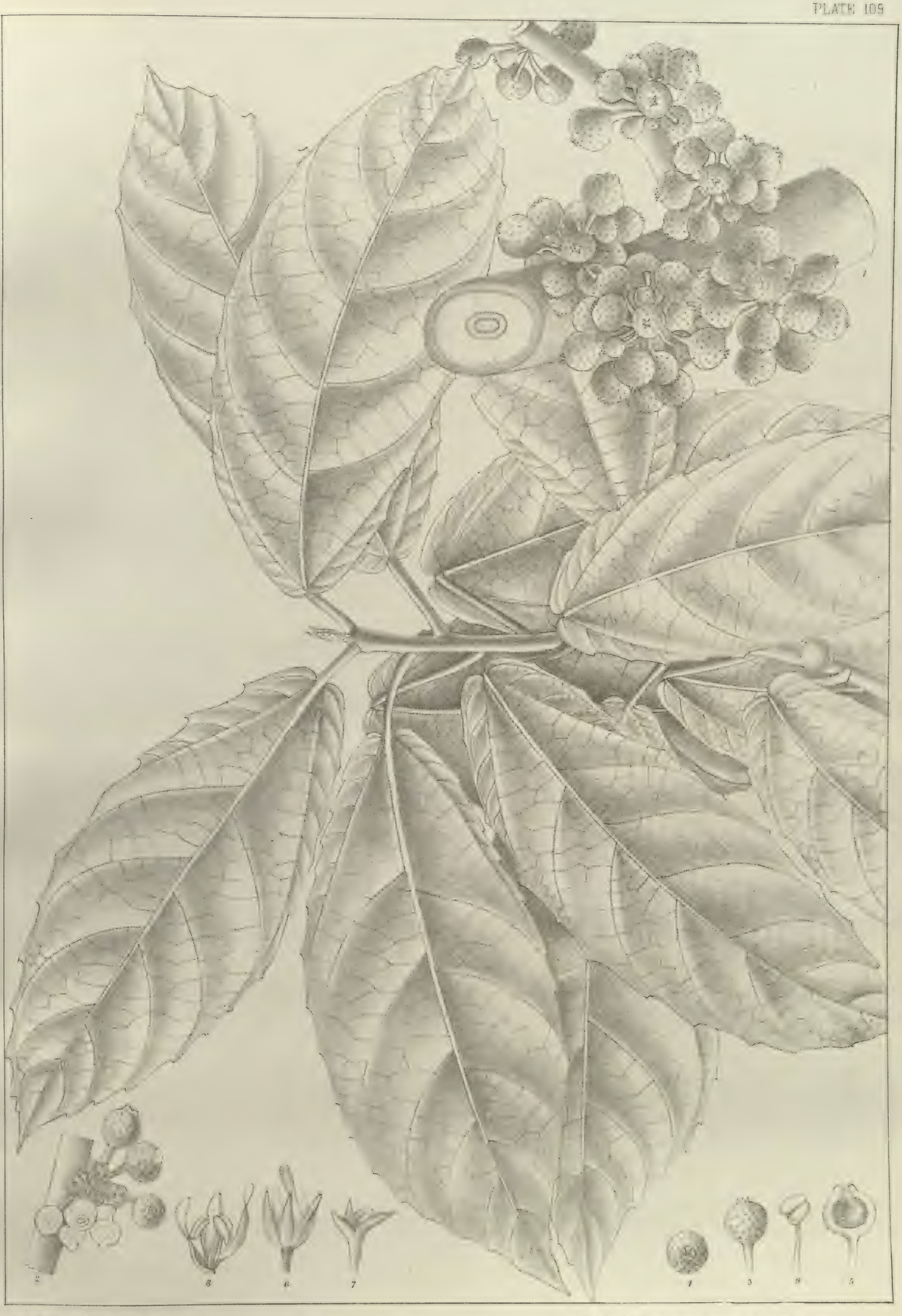
FICUS BALICA, Miq.



[illegible] del. Bot. Garden Calcutta.

Lith by J. C. Chuckerbutty Govt. School of Art, Calcutta.

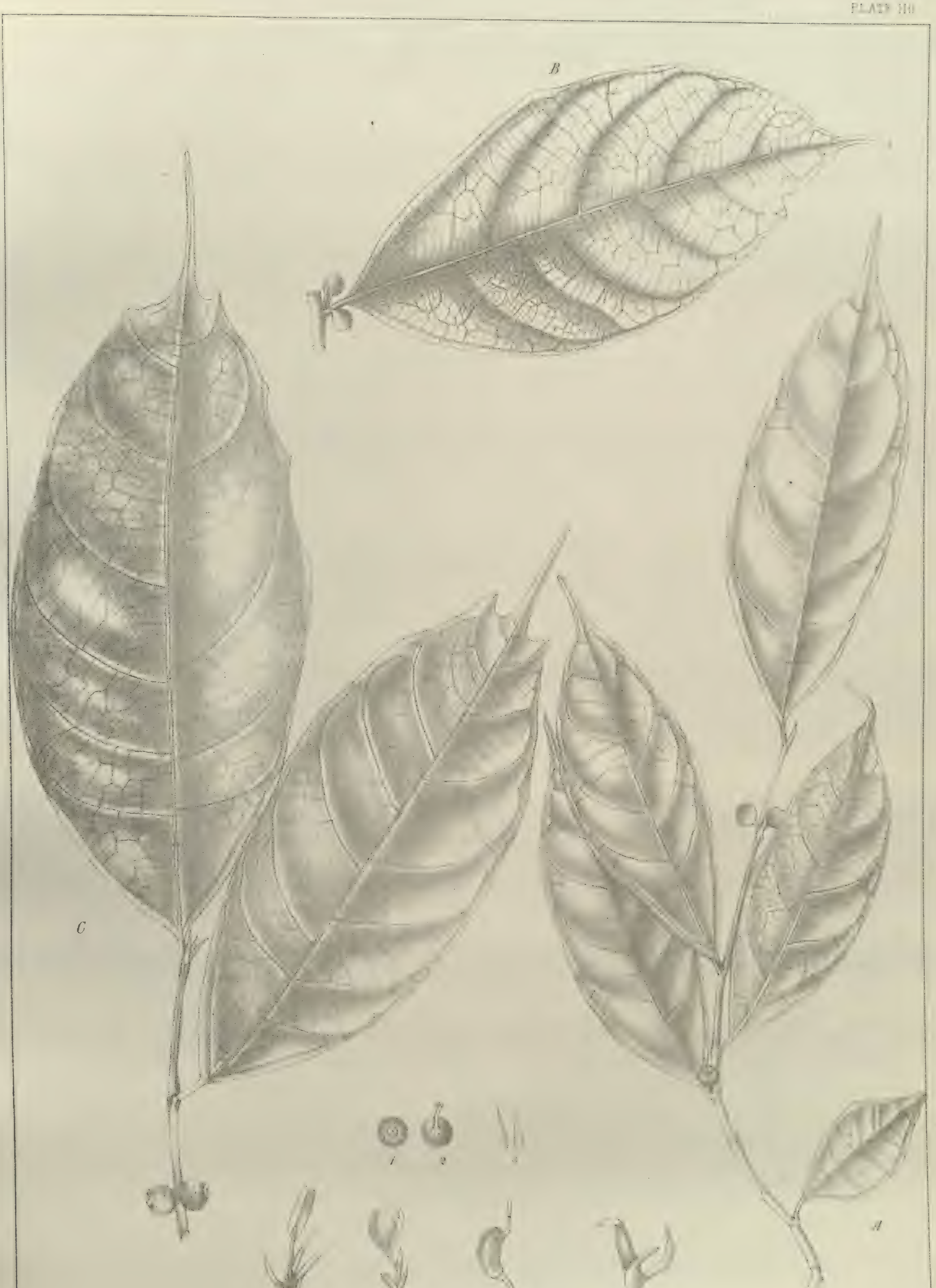
FICUS RUDIS, Miq.



G. C. Das del Bot. Garden Calcutta.

Lith. by J. C. Chuckerbutty Govt. School of Art Calcutta.

FICUS COPIOSA. Steud.

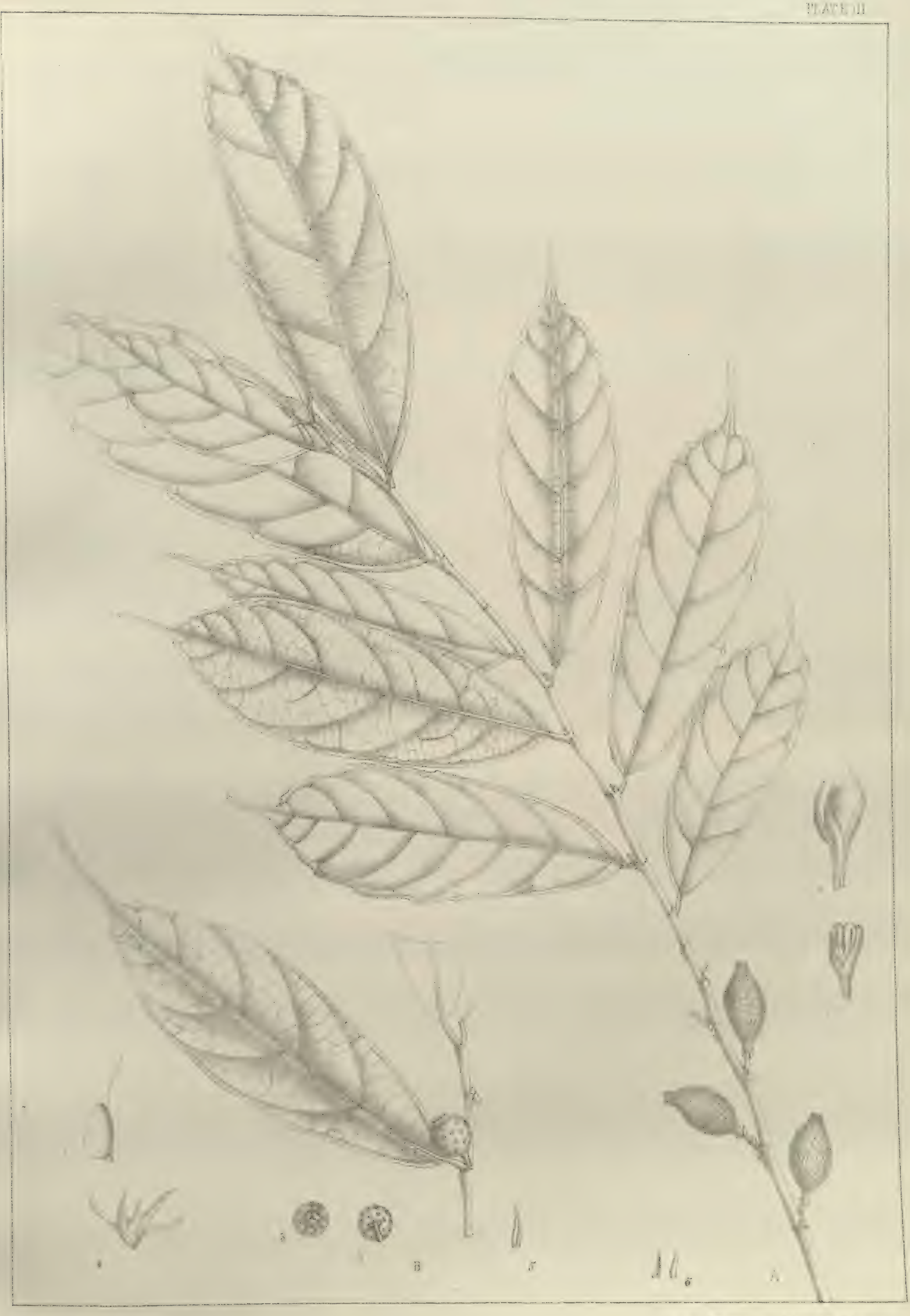


G. C. Das del B. d. Garden Calcutta.

Lith. by J. C. Chuckerbutty Govt School of Art Calcutta.

FICUS ROSTRATA, Lamk.

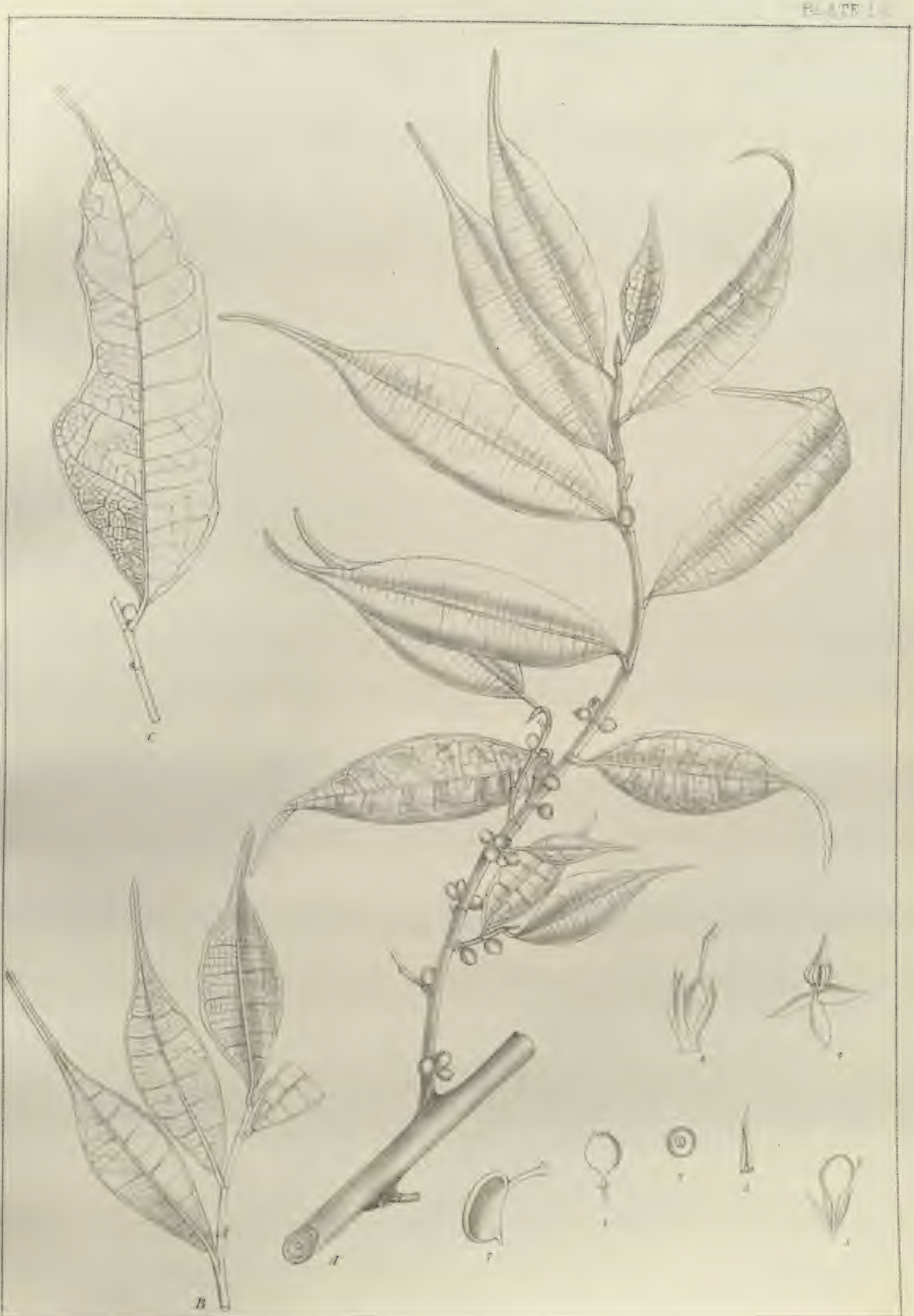
PLATE III



C.C. Dass del. Bot. Garden Calcutta

Lith. by S. Banerji, Govt. School of Art Calcutta.

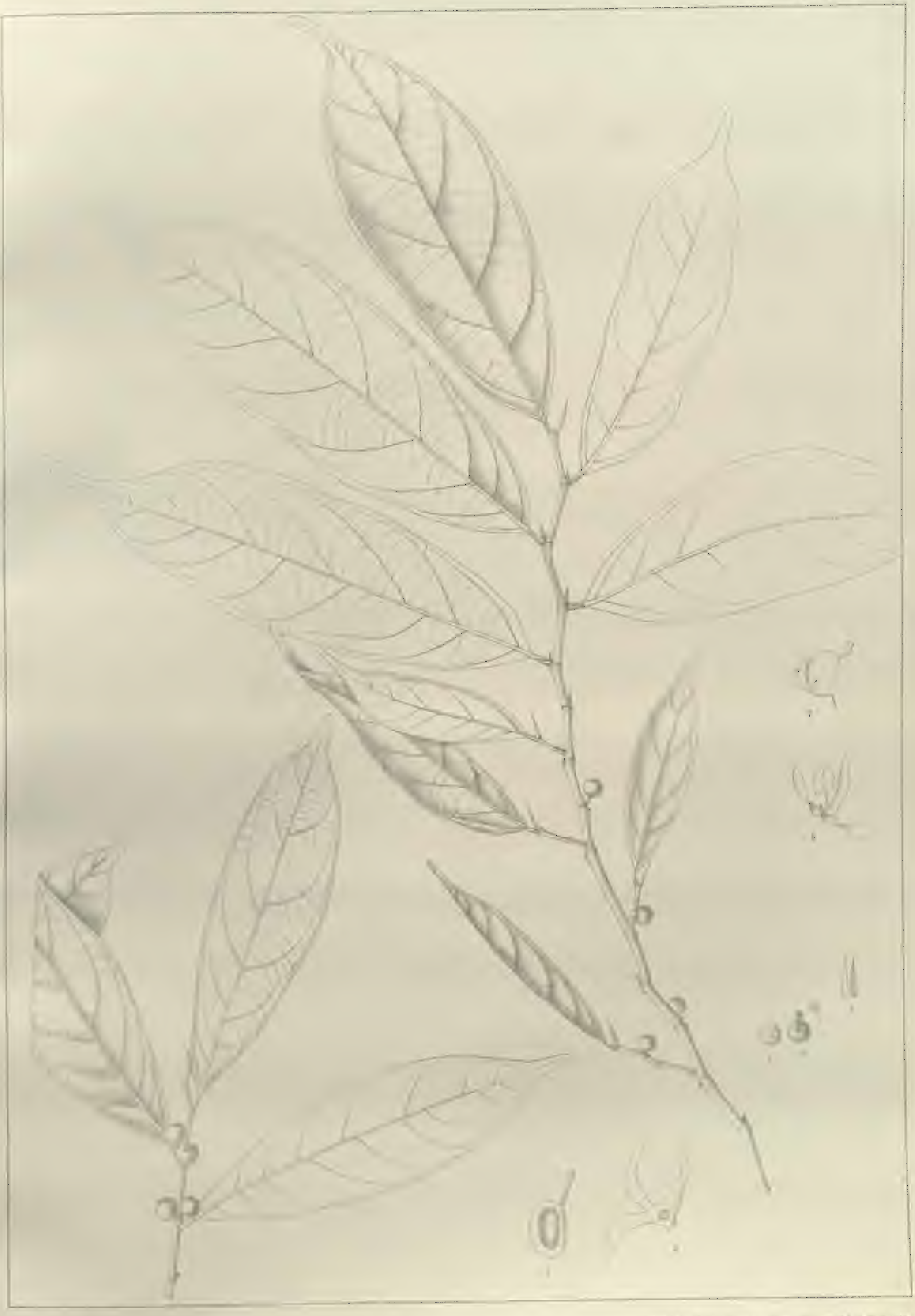
FICUS CLAVATA, Wall.



G. C. Das del. Bot. Garden Calcutta

Lith. by J. C. Chuckerbutty Govt. School of Arts Calcutta

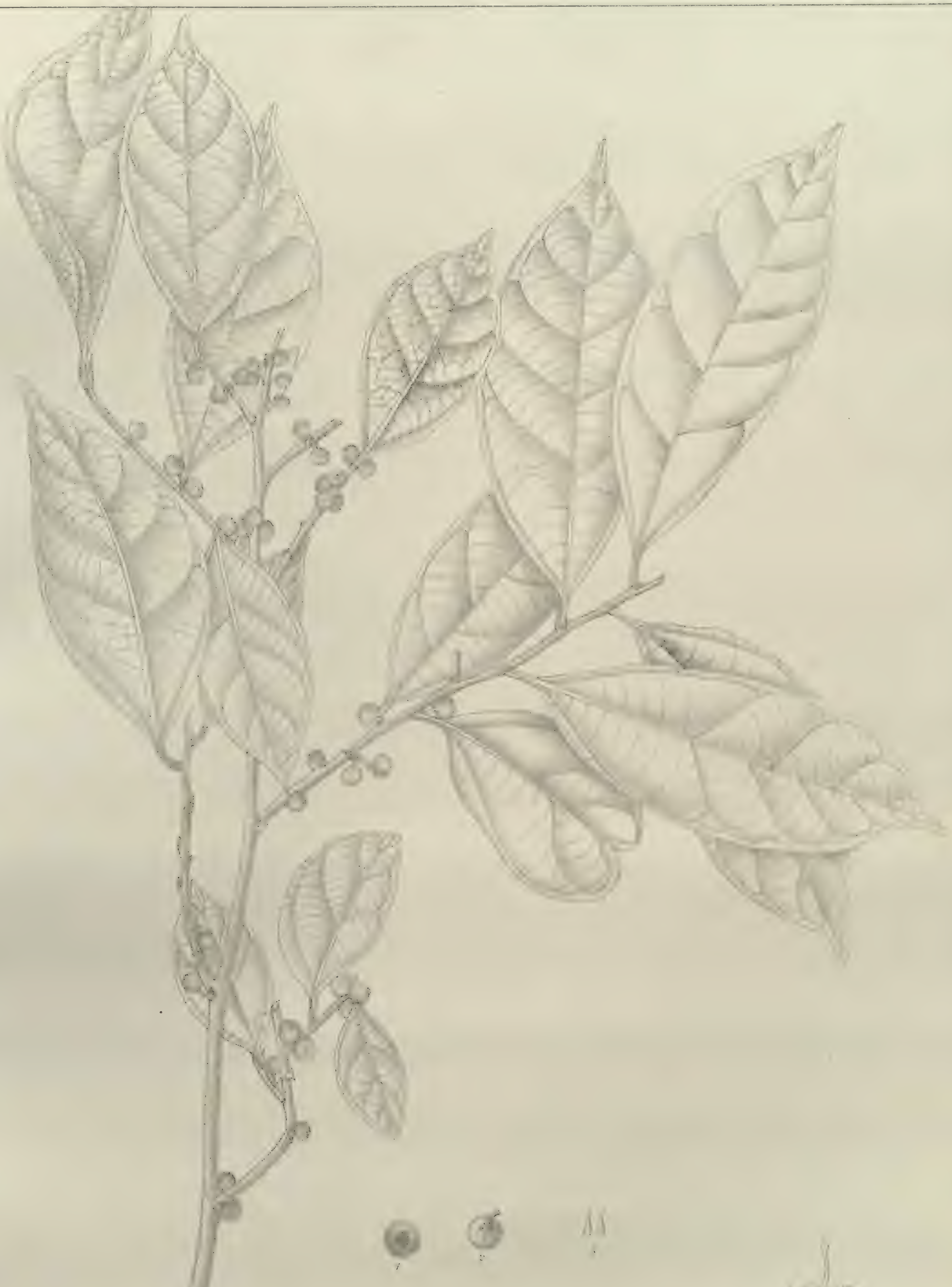
FICUS CUSPIDATA, Reinw.



[illegible]

Lith. by H. C. Ghose, [illegible] Calcutta.

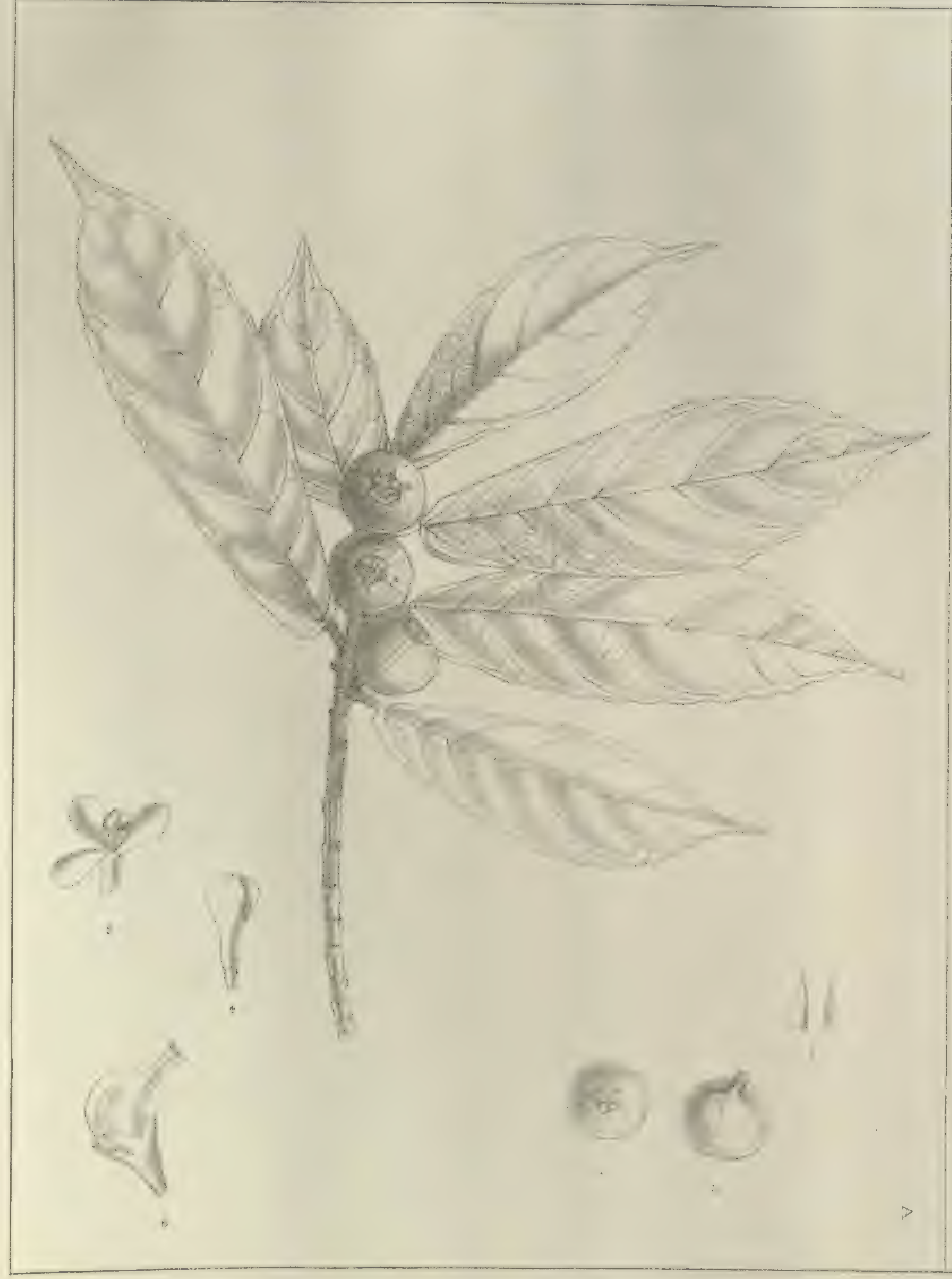
FICUS SIKKIMENSIS, Miq.

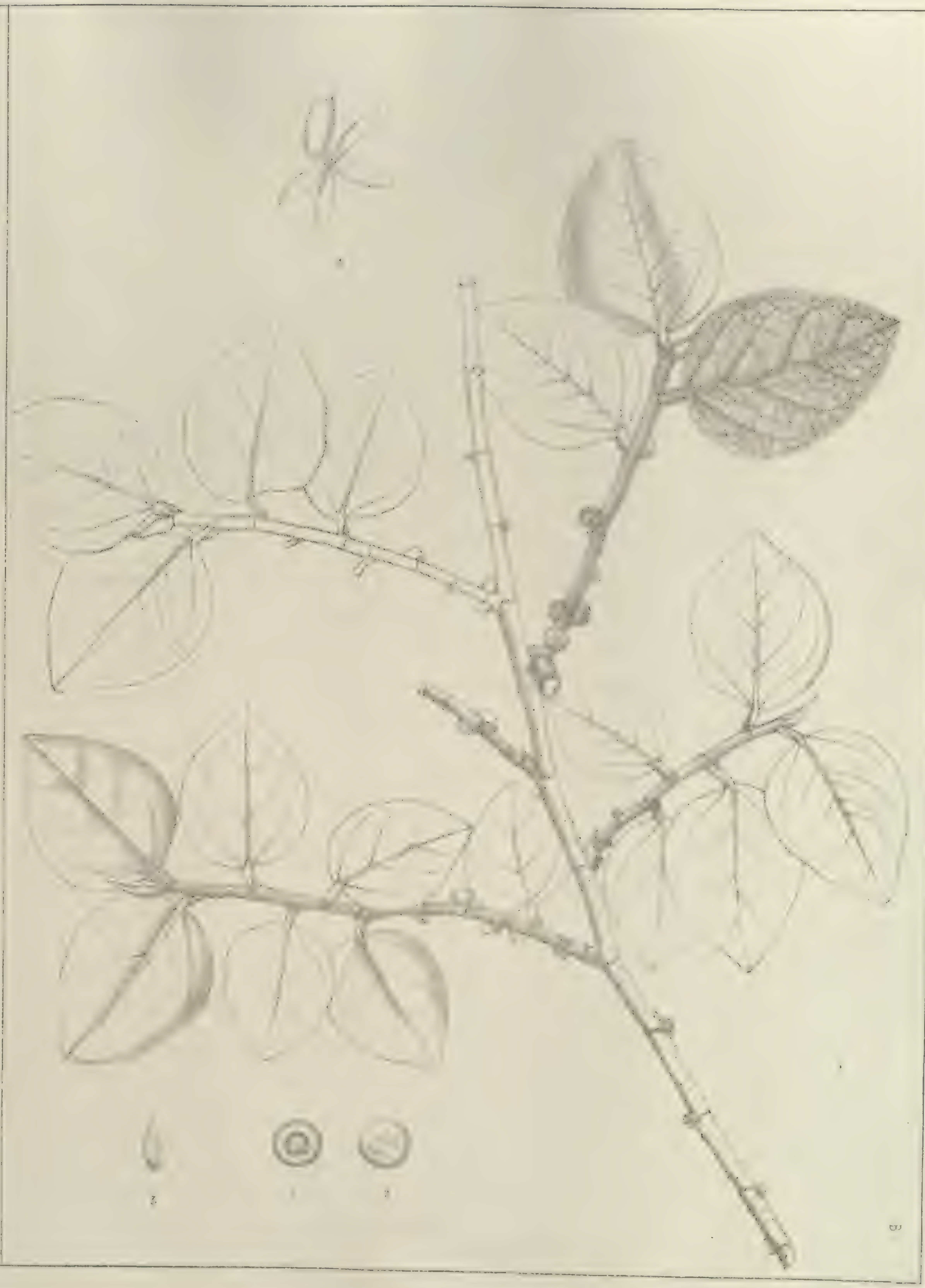


G. C. Das del. Bot. Garden Calcutta.

Lith by J. C. Chuckerbutty Govt. School of Art Calcutta.

FICUS AMPELAS, Burm.



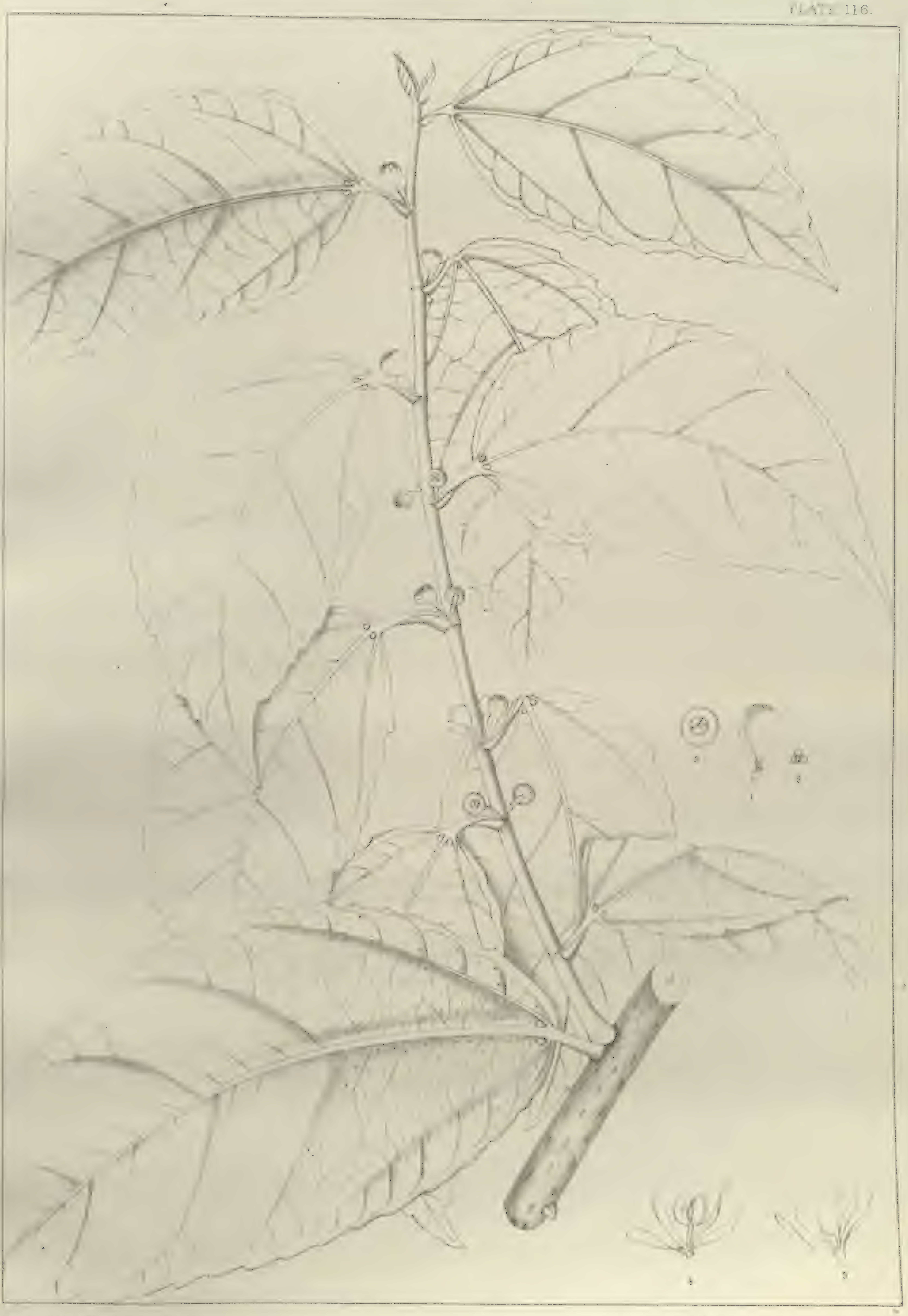


A. C. Das del. Bot. Garden, Calcutta.

FICUS UMBONATA, Reinw.

Lith by S. C. [illegible]

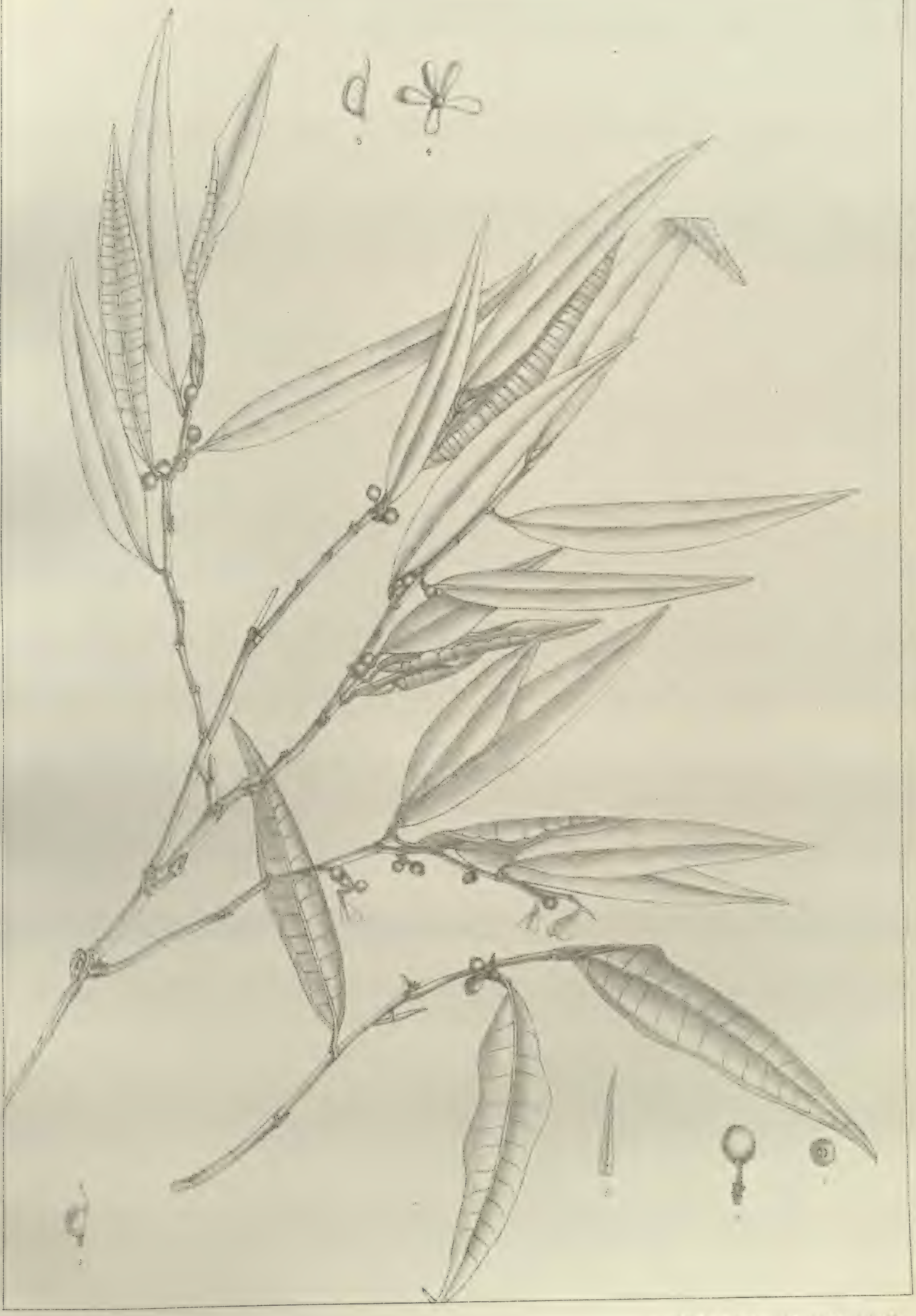
FICUS EXCAVATA, King.



G. C. Das del. Bot. Garden Calcutta.

Lith. by H. C. Ghosal Govt. School of Art Calcutta.

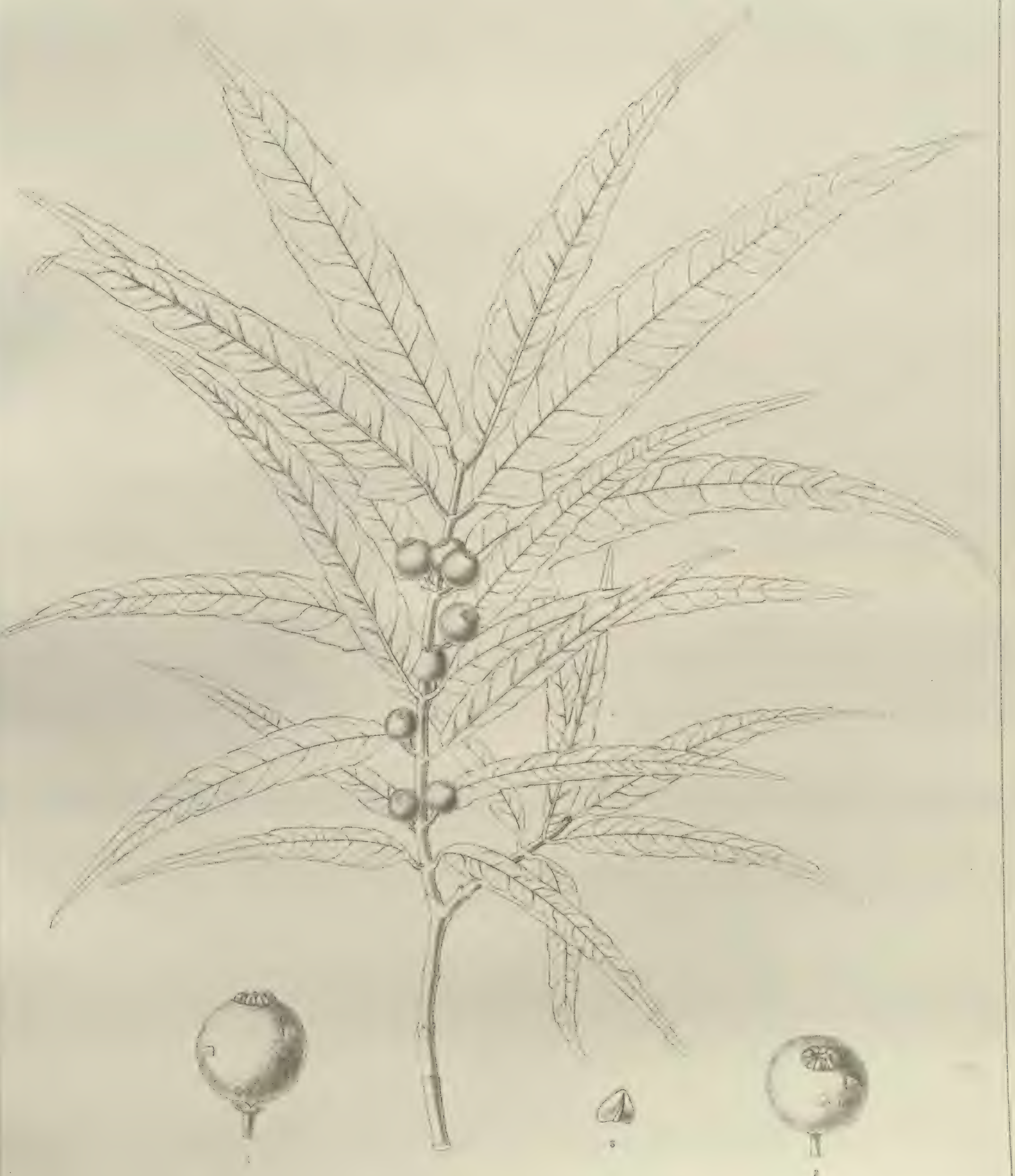
FICUS ASPERIOR, Miq.



G. C. Das del. Bot. Garden Calcutta.

Lith. by S. K. Roy. Govt. School of Art Calcutta.

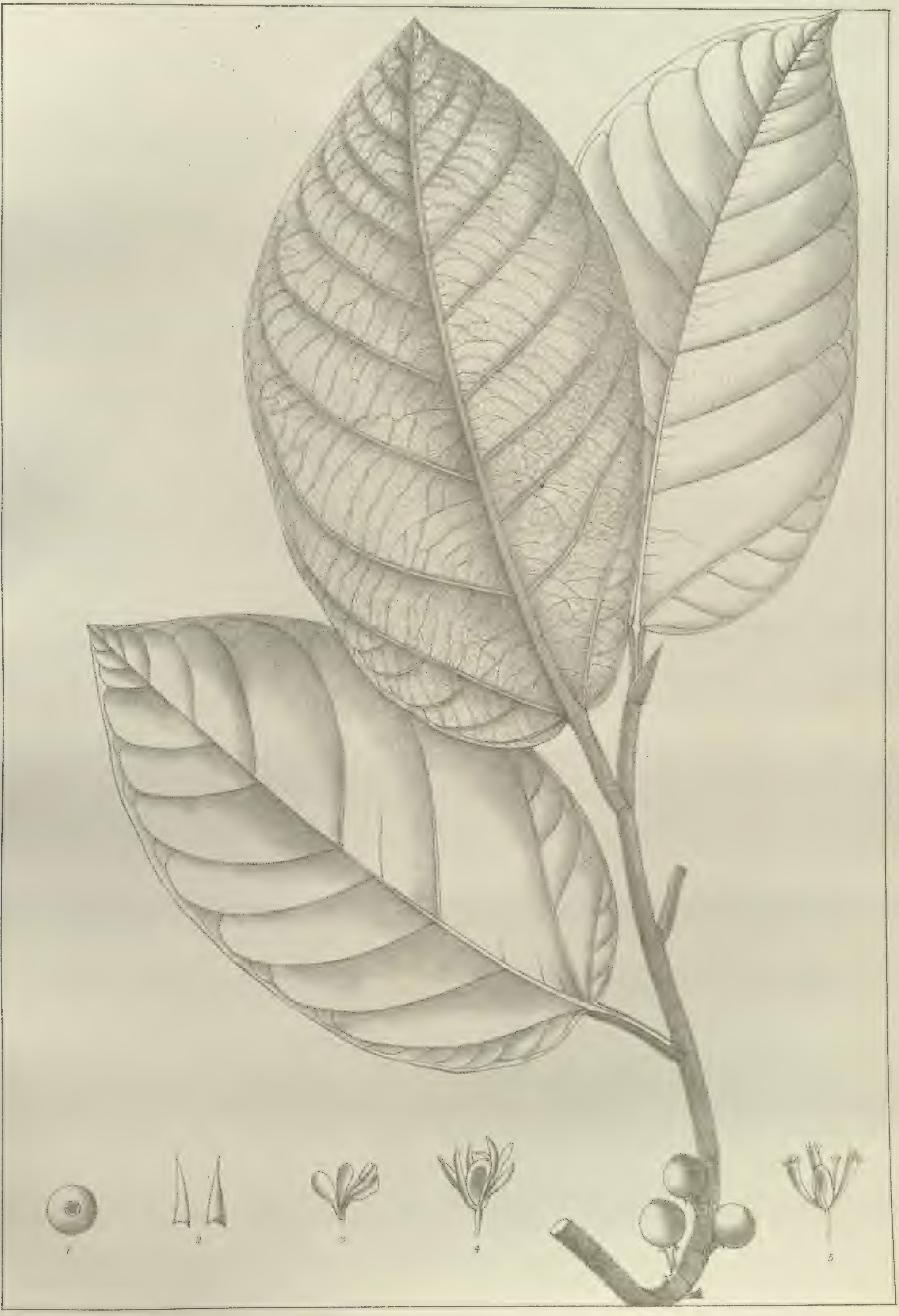
FICUS IRREGULARIS, Miquel.



M. Smith del.

Lith. by H. C. Ghosal, Govt. School of Art Calcutta.

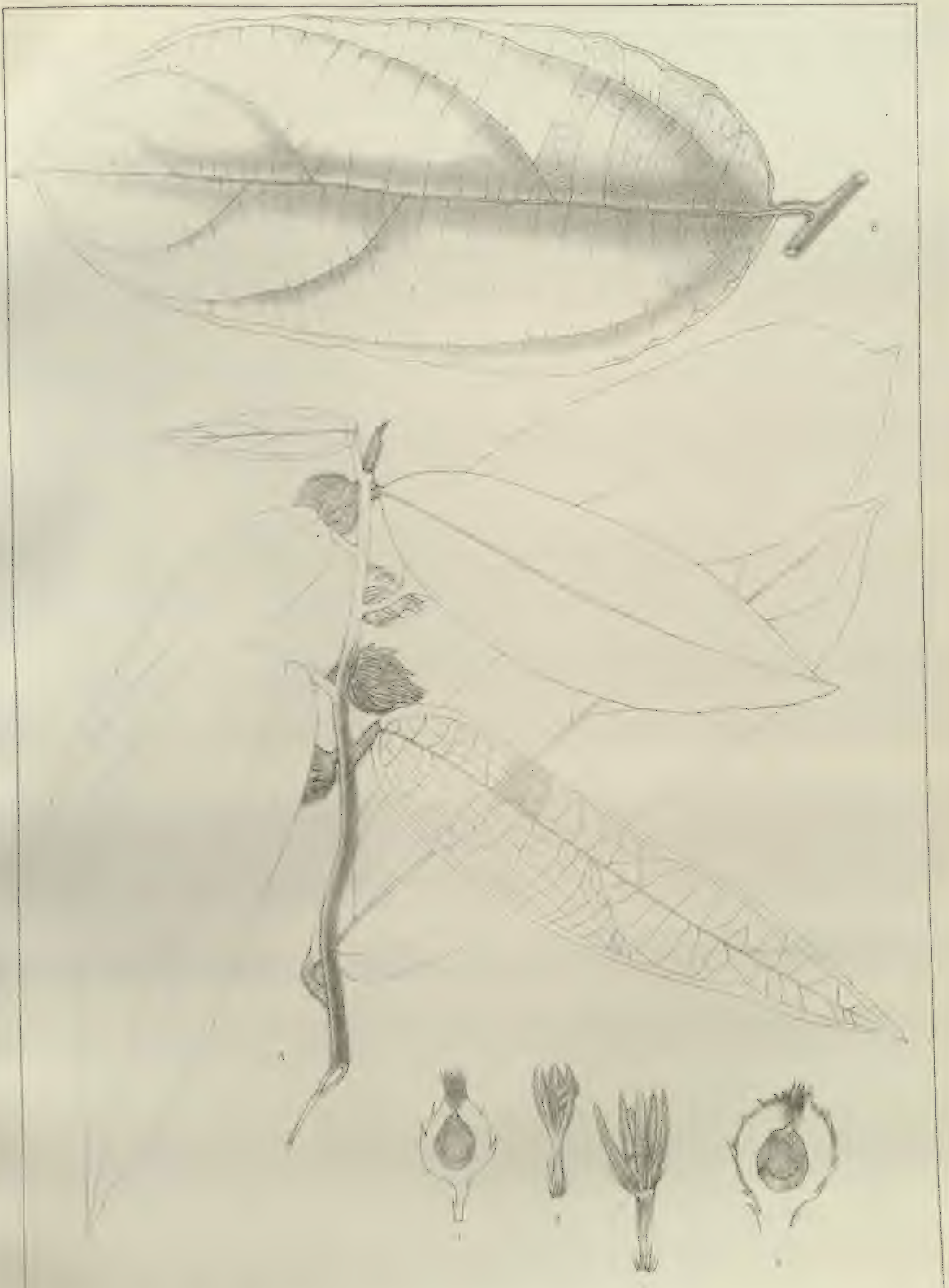
FICUS CUMINGII, Miq.



S. C. Das del. Bot. Garden Calcutta

Lithog. I. C. Chuckerbutty, Govt. School of Art, Calcutta.

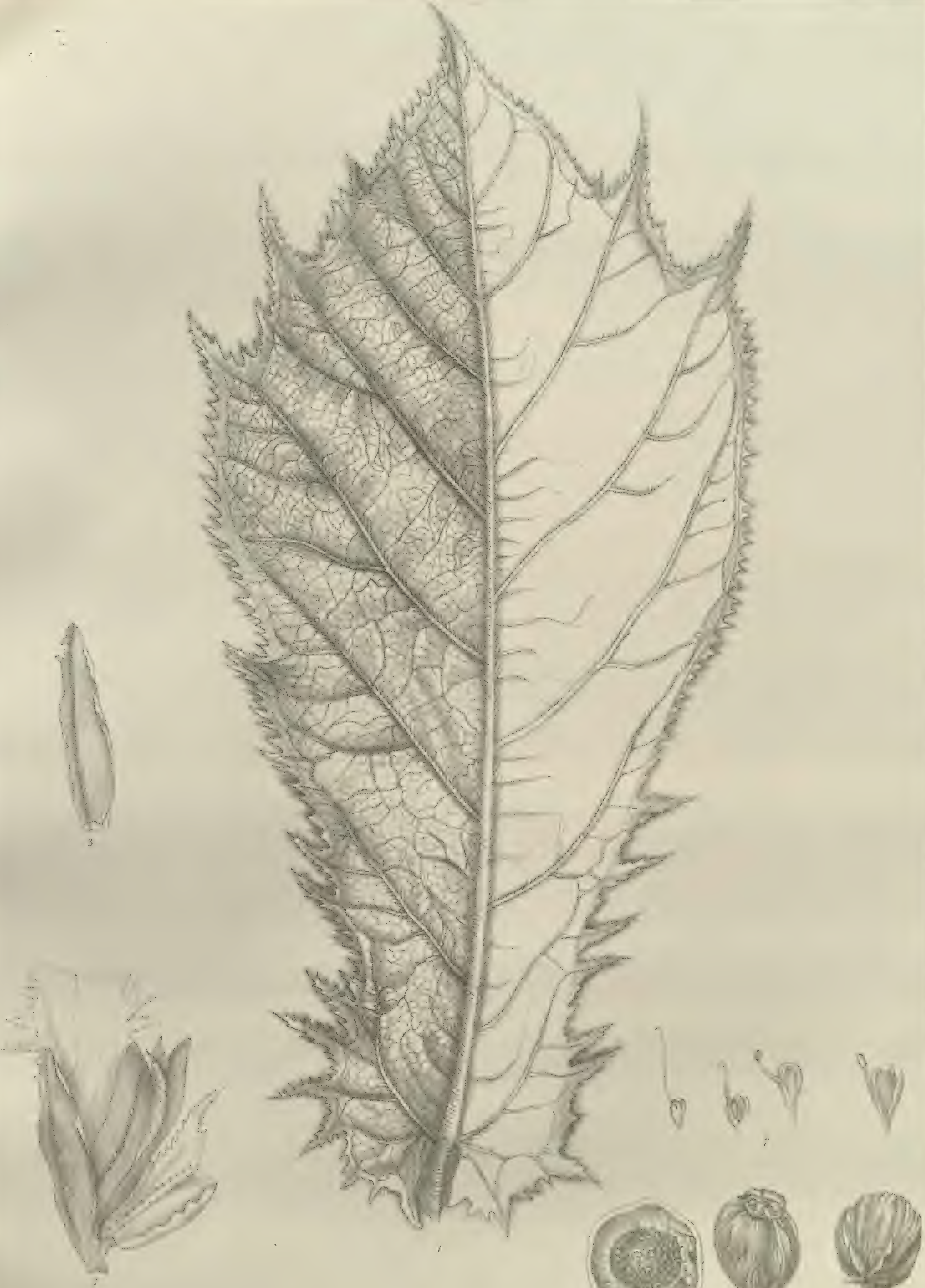
FICUS MELINOCARPA, Bl.



G. D. Das del. [illegible]

Lith. by S. C. Mukerjee [illegible]

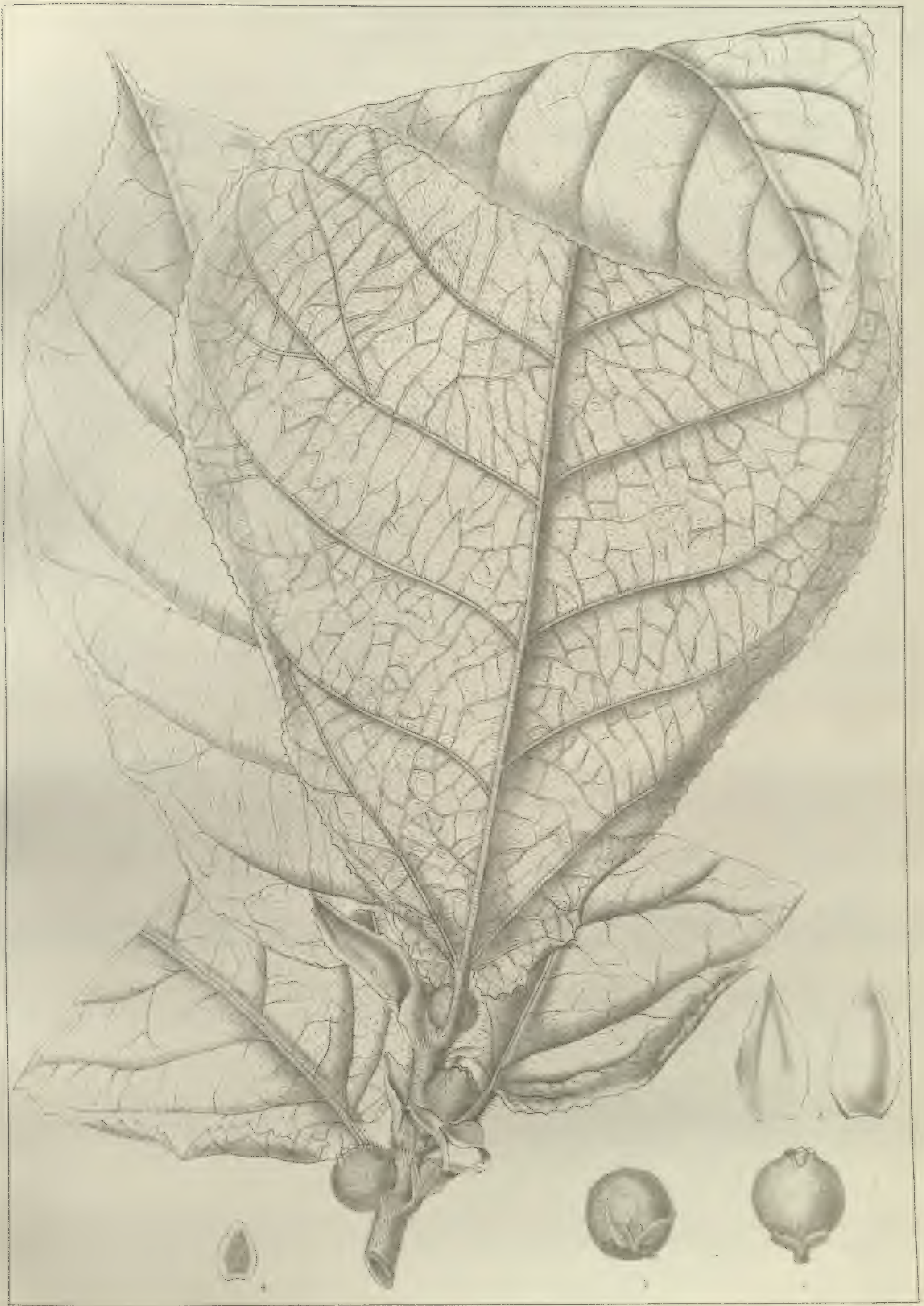
FICUS RIEDELII, Teysmann.



G. C. Das del Bot. Garden Calcutta.

Lith by J. C. Chuckerbutty Govt. School of Art Calcutta.

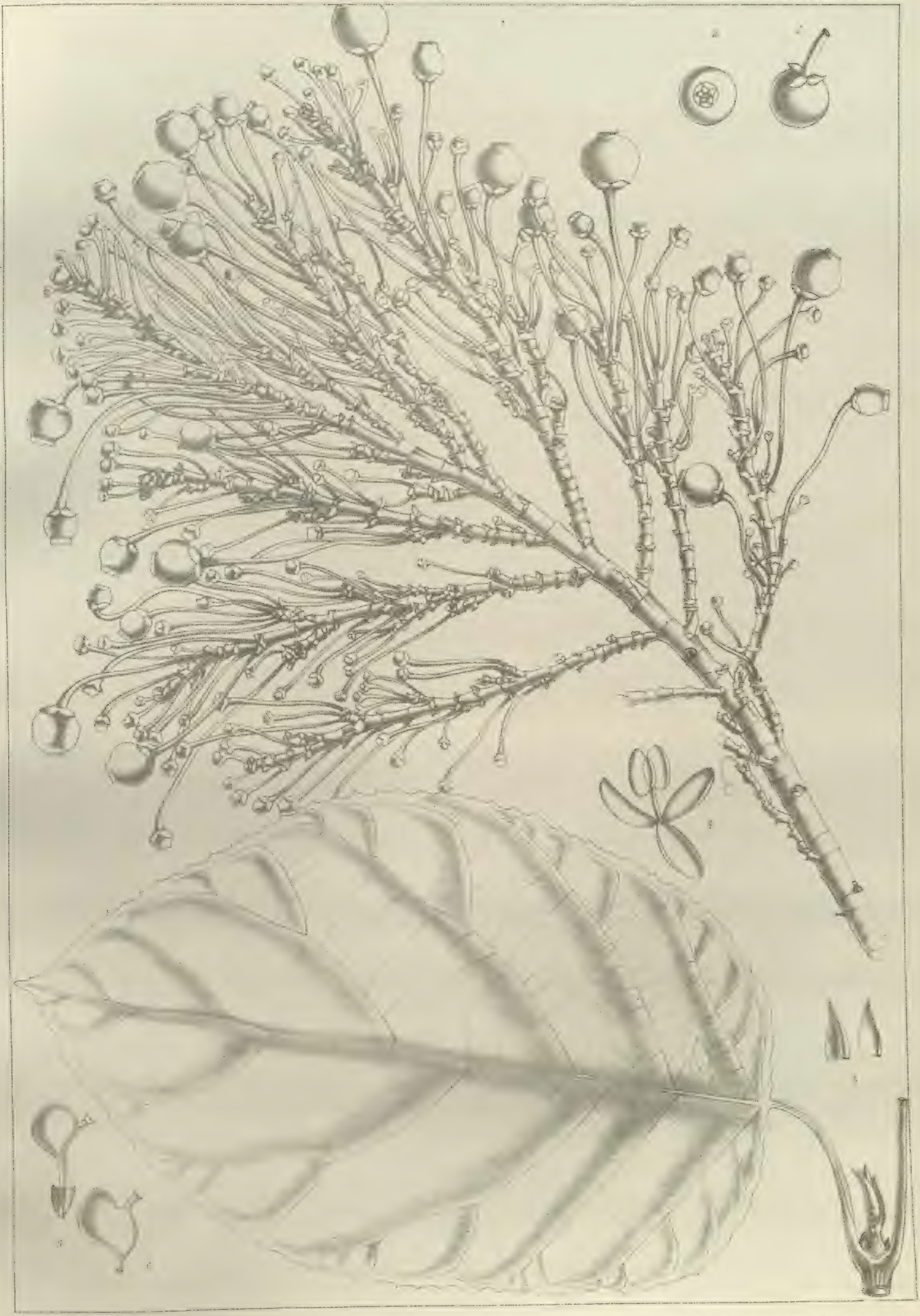
FICUS DECIPIENS, King.



M. Smith del.

Lith. by J.C. Chuckerbutty Govt. School of Art Calcutta.

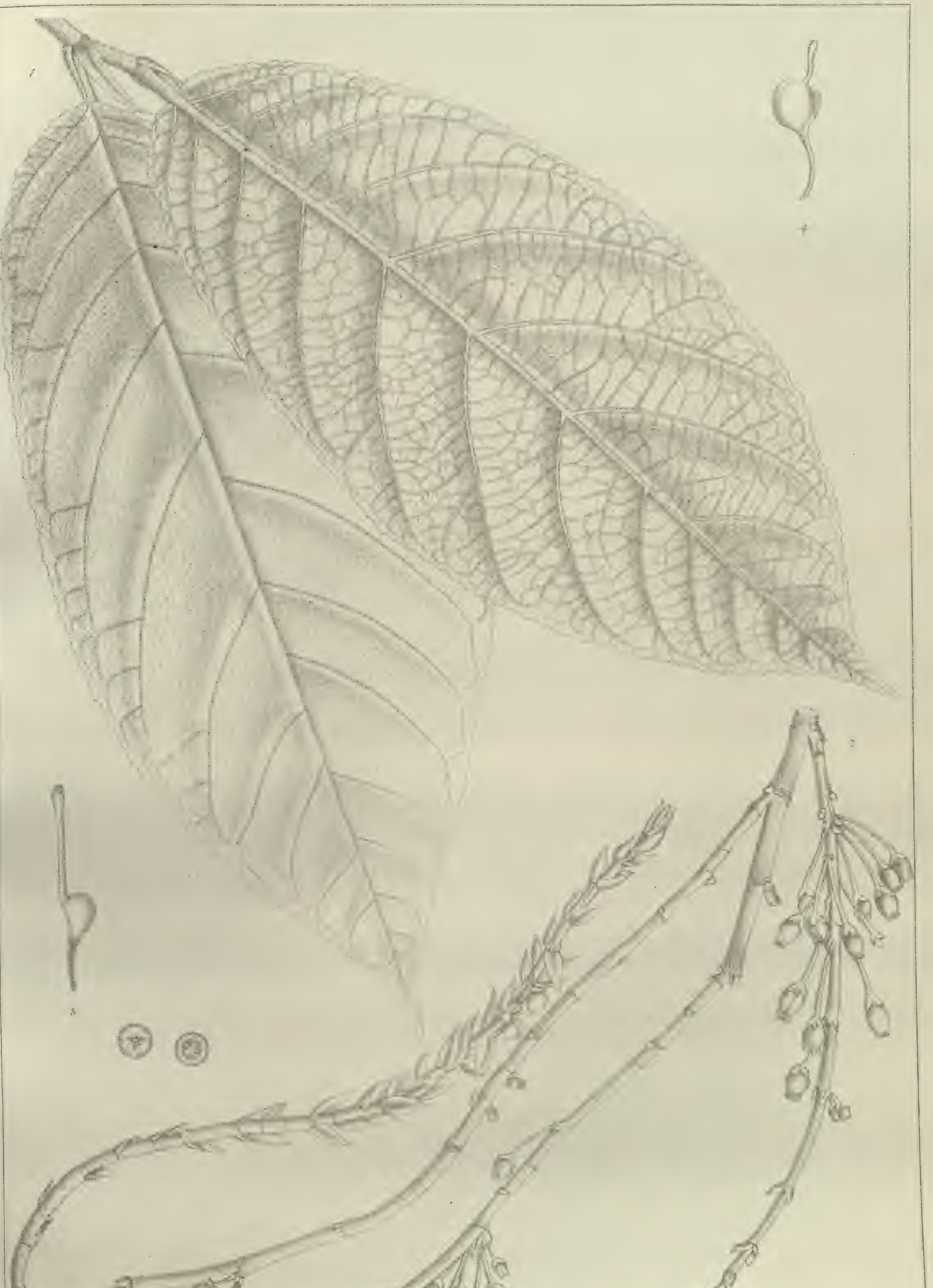
FICUS PUNGENS, Reinw.



A. L. Singh del. Bot. Garden Calcutta.

Lith. by [illegible] Govt. School of Art, Calcutta.

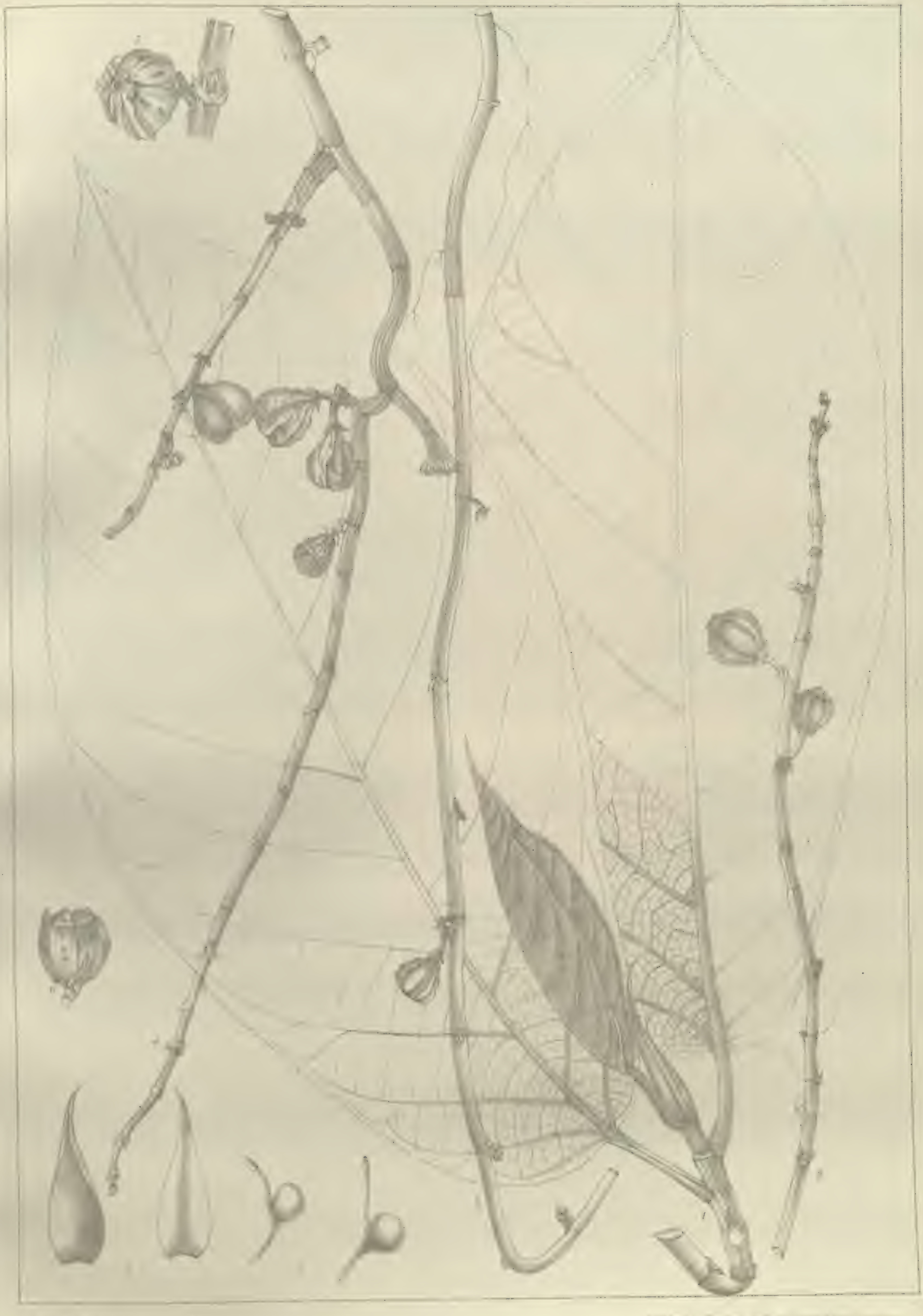
FICUS CONGLOBATA King.



A. C. Singh. del Bot. Garden Calcutta.

Lith by H.C.Ghosal. Govt. School of Art, Calcutta.

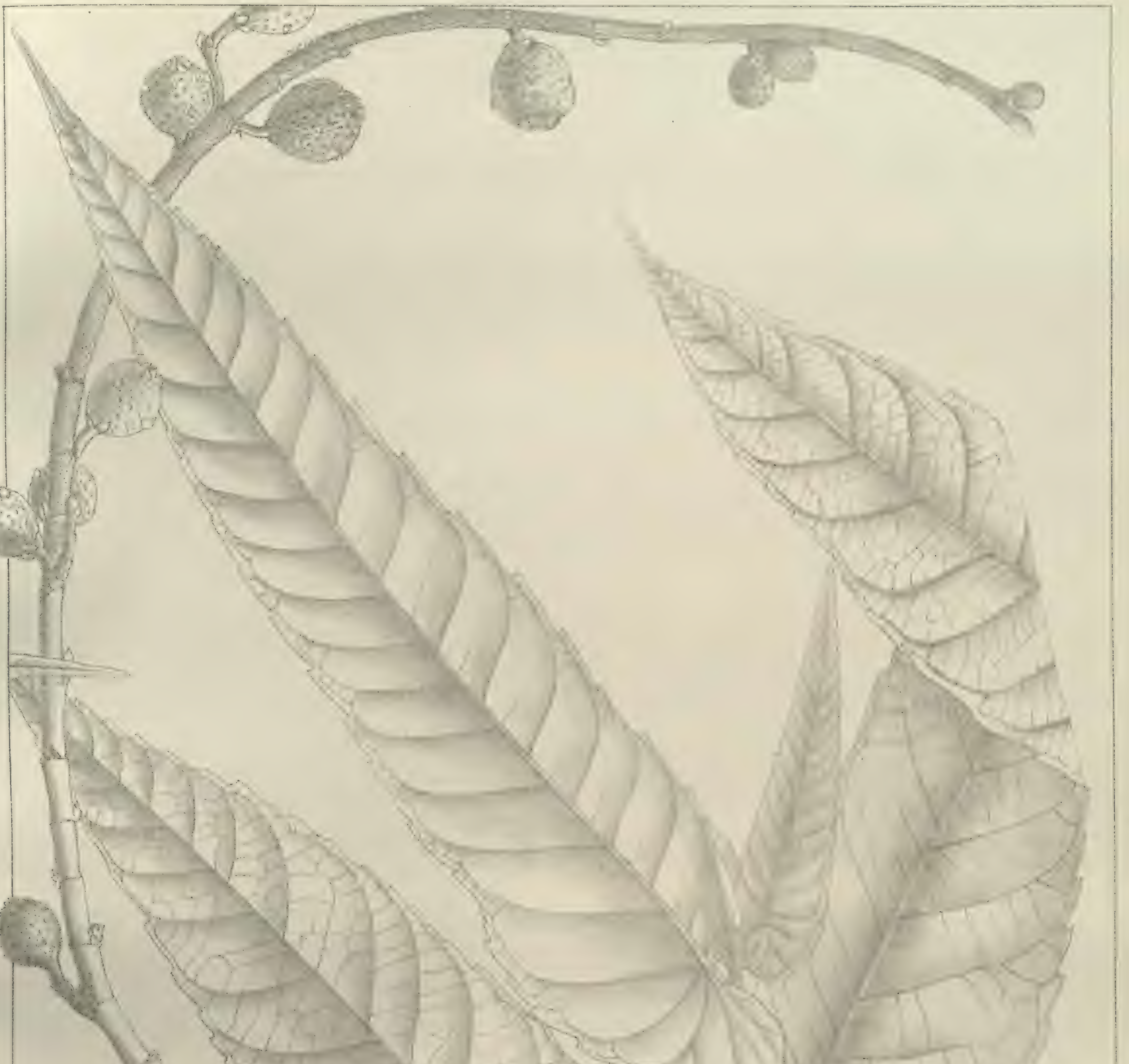
FICUS VRIESIANA, Miq.



[illegible]

[illegible]

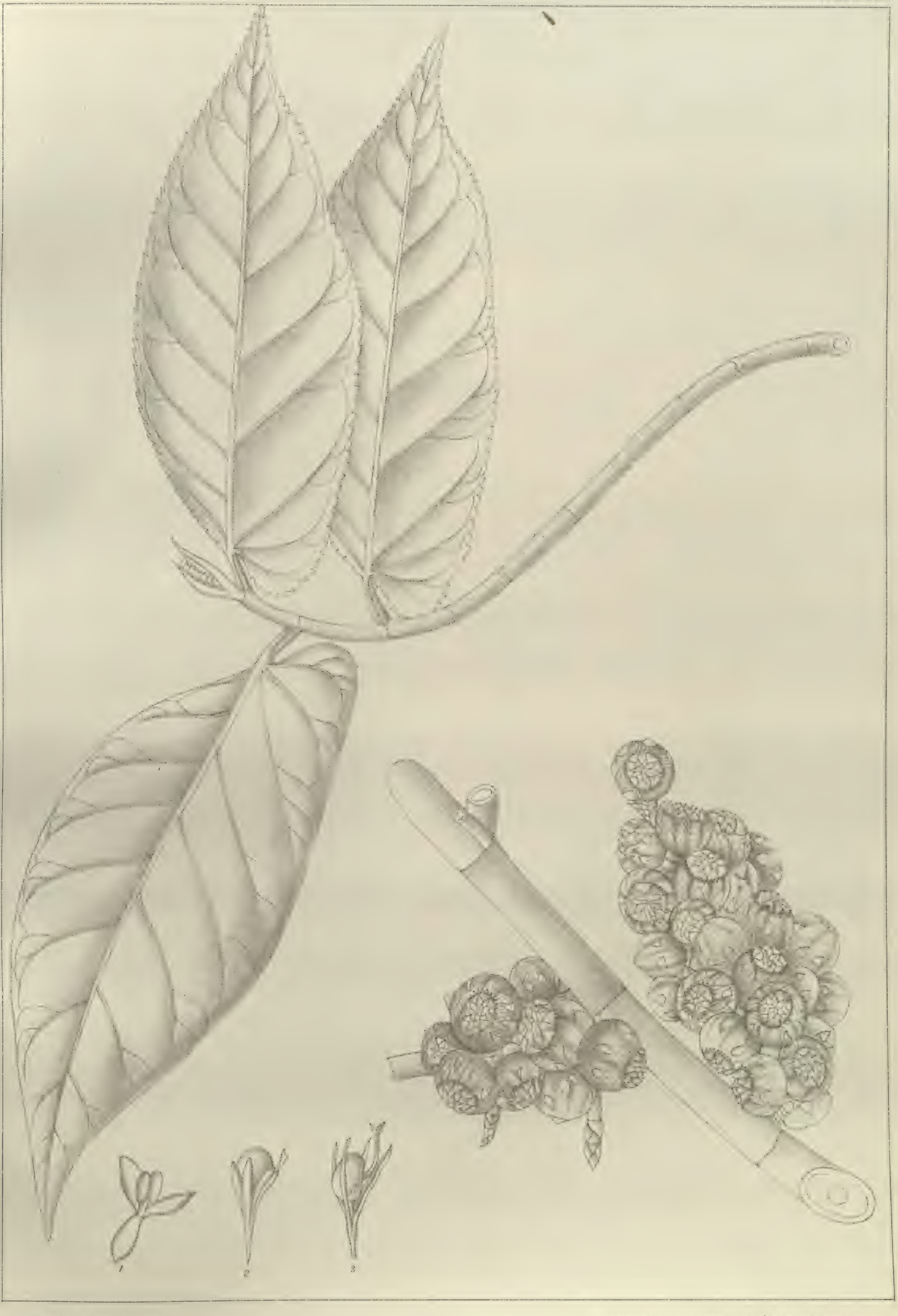
FICUS HYPOGÆA, King.



A. Singh del. Bot. Garden Calcutta.

Lith. by C. L. Das. Calcutta.

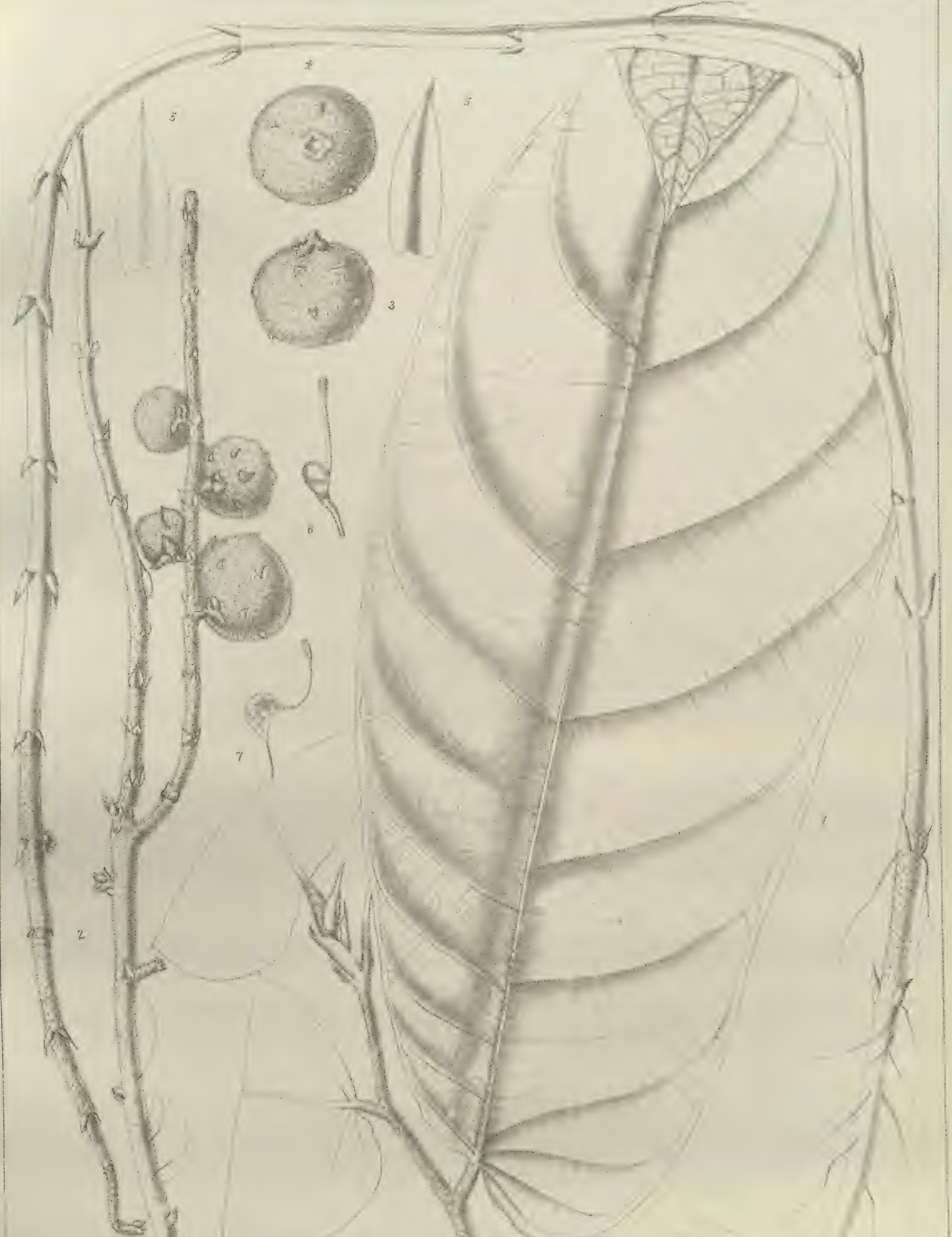
FICUS CUNIA, Ham.



G.C. Das del. Bot. Garden, Calcutta.

Lith. by J.G. Clarke Asst. Supt. School of Art, Calcutta.

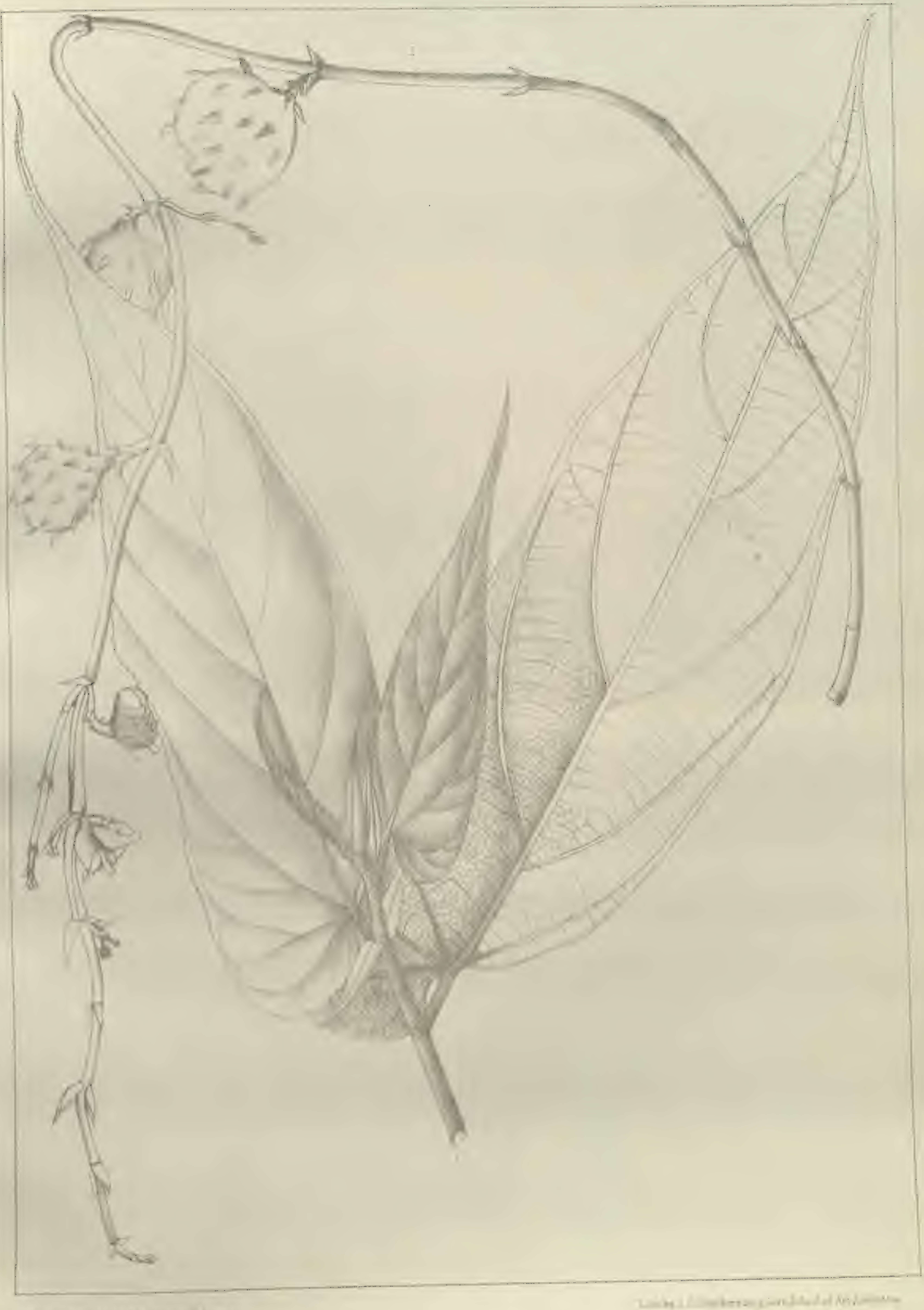
FICUS CUNIA, Ham. Var. conglomerata.



A. L. Singh, del. Bot. Garden Calcutta.

Lith by B. C. Goswami Govt. School of Art Calcutta.

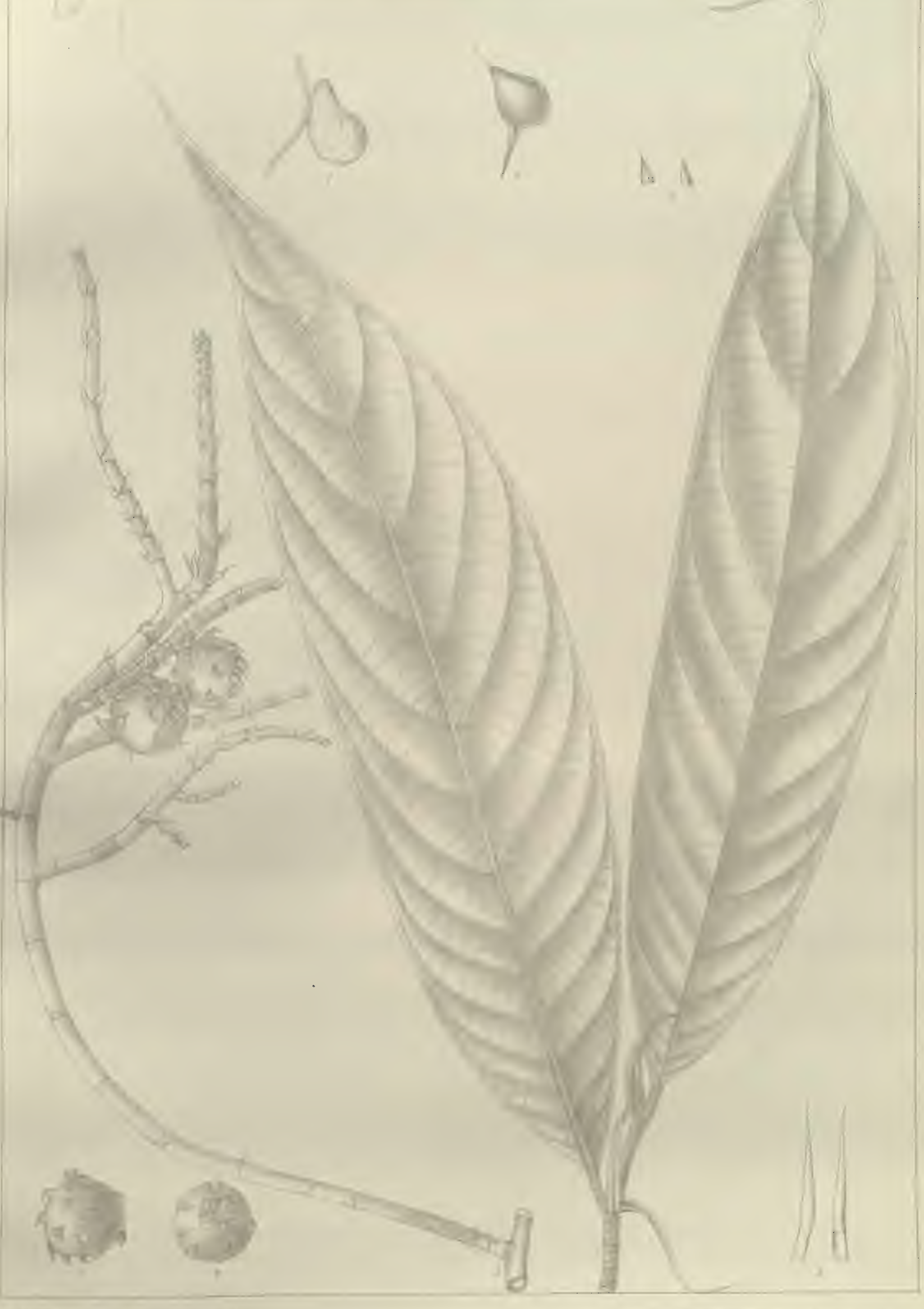
FICUS GEOCARPA, Teysm.



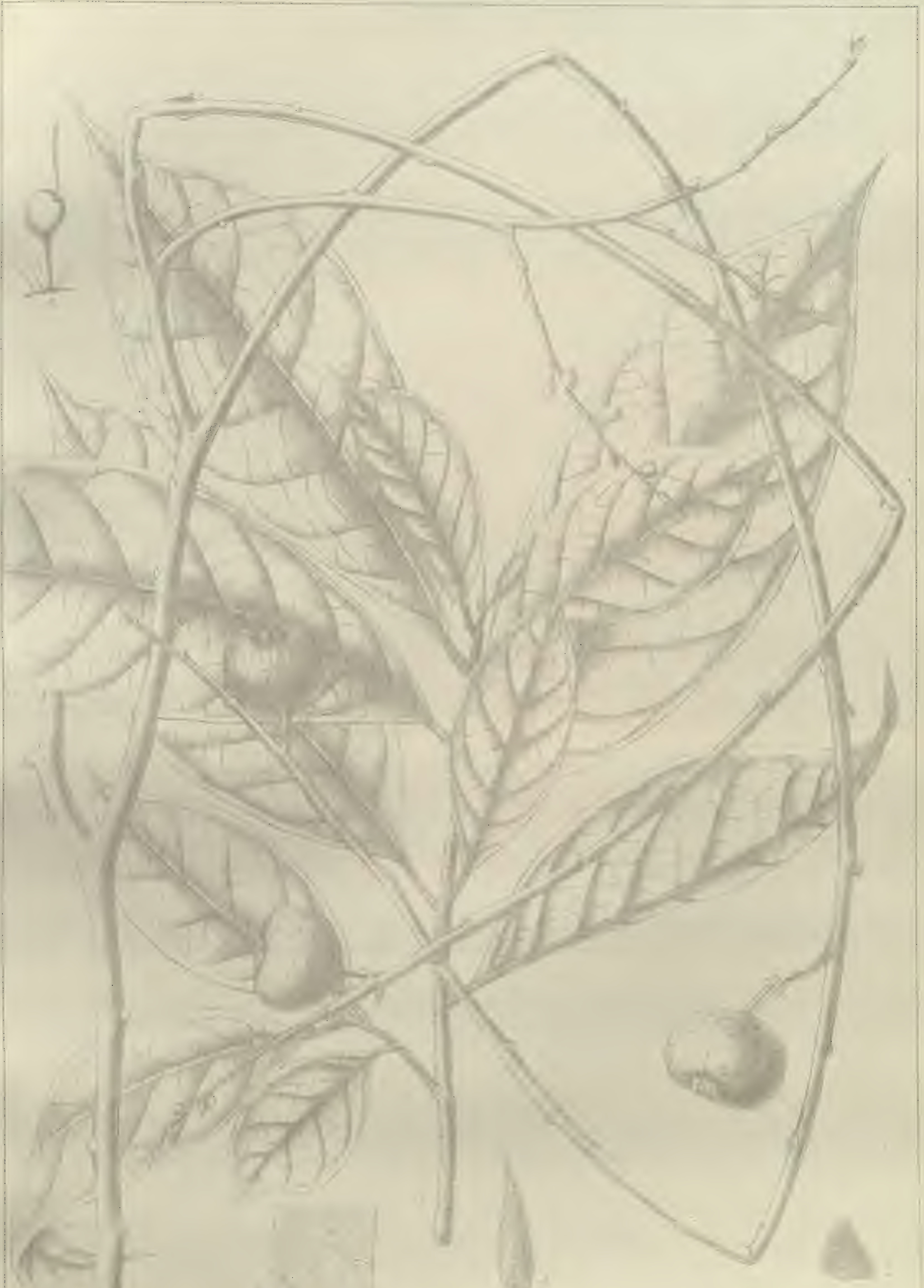
[illegible]

[illegible]

FICUS [illegible], Teysm., Var. [illegible]

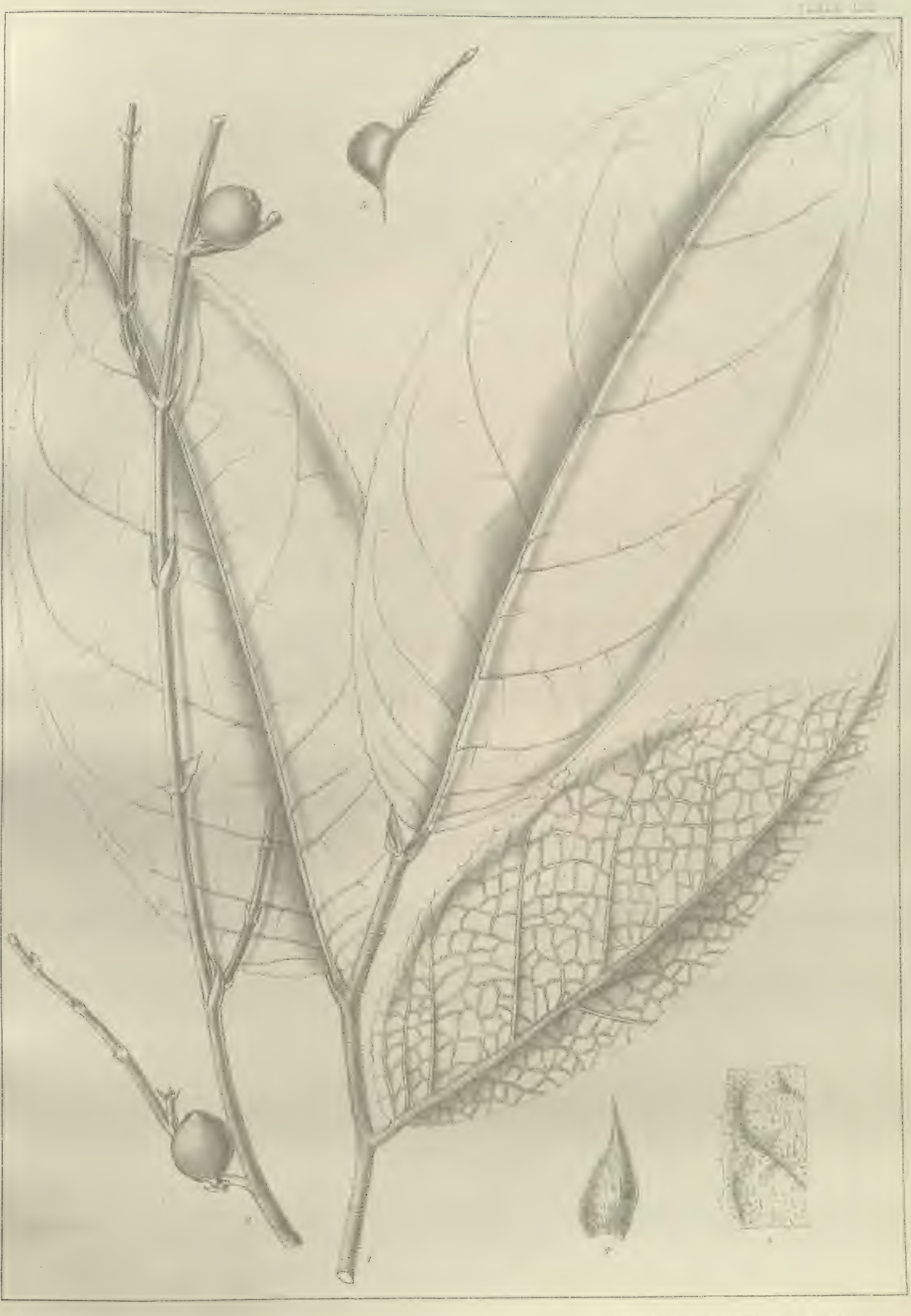


[illegible] Miq.



[illegible]   [illegible]

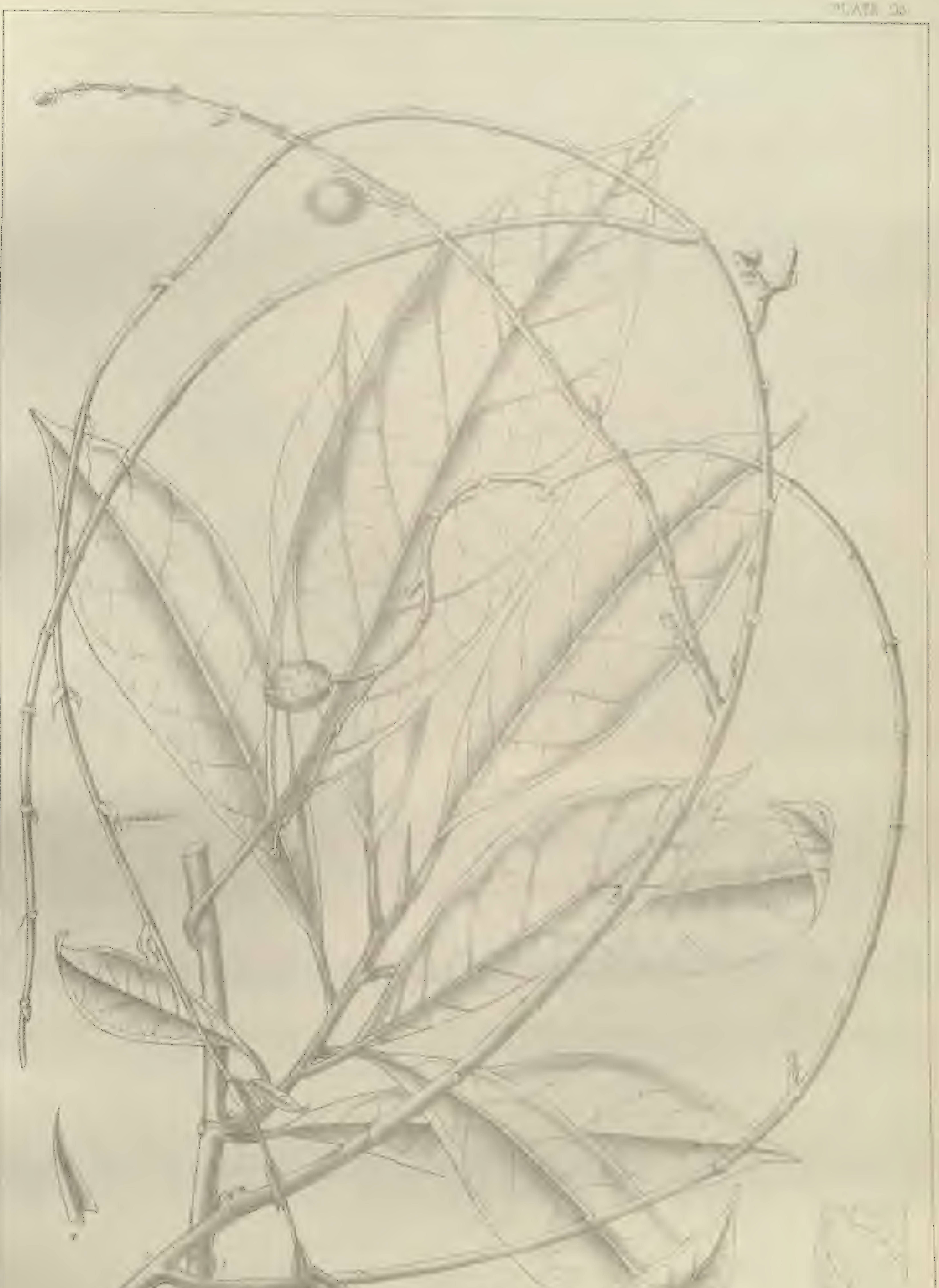
FICUS CONORA, King.



[illegible] del.

[illegible]

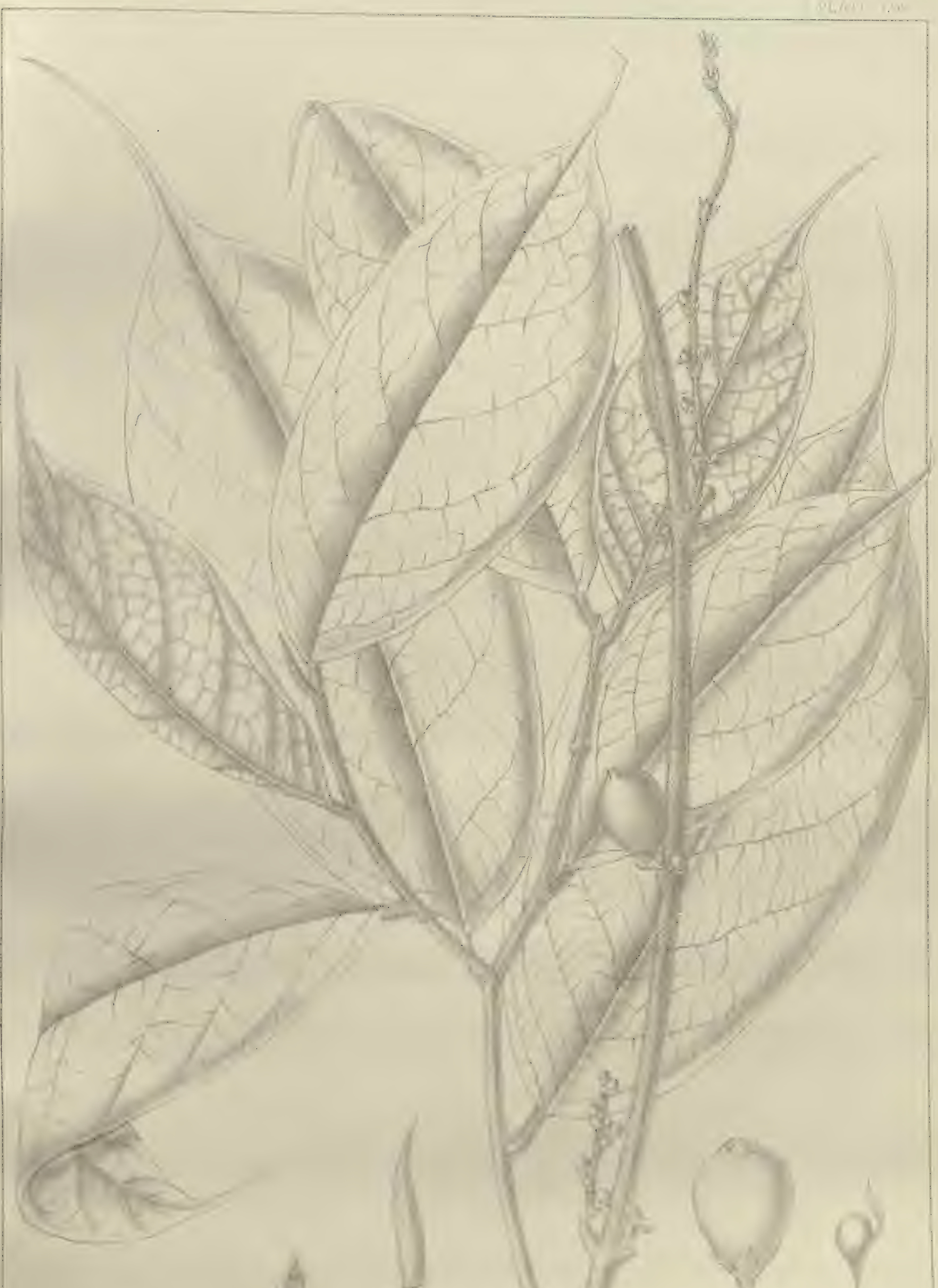
FICUS STOLONIFERA, King.



M. Sintoo del.

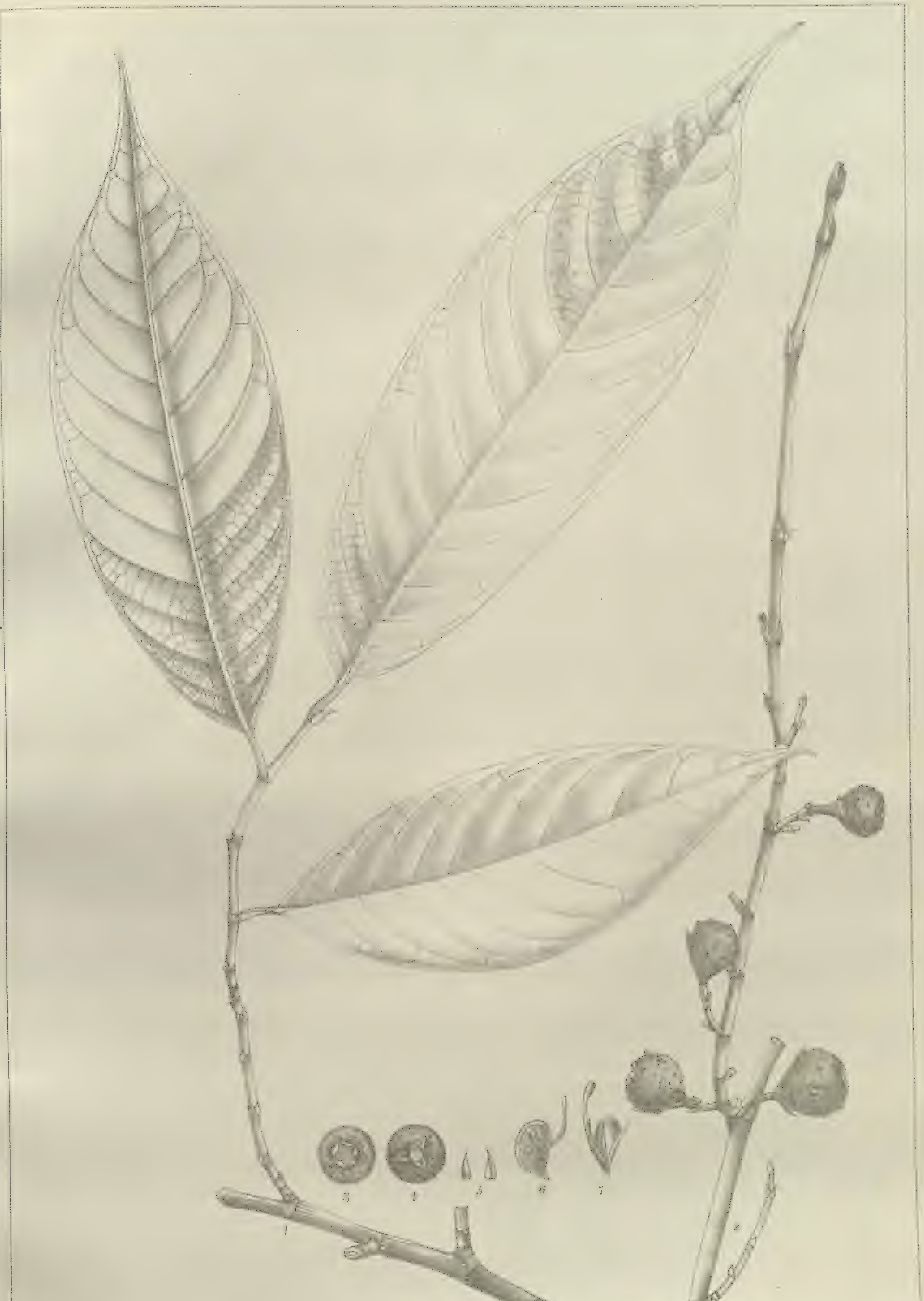
Lith. by J. Schaumburg, Govt. School of Art, Calcutta.

FICUS ARAYENSIS, King.



M. Smith del. [illegible]

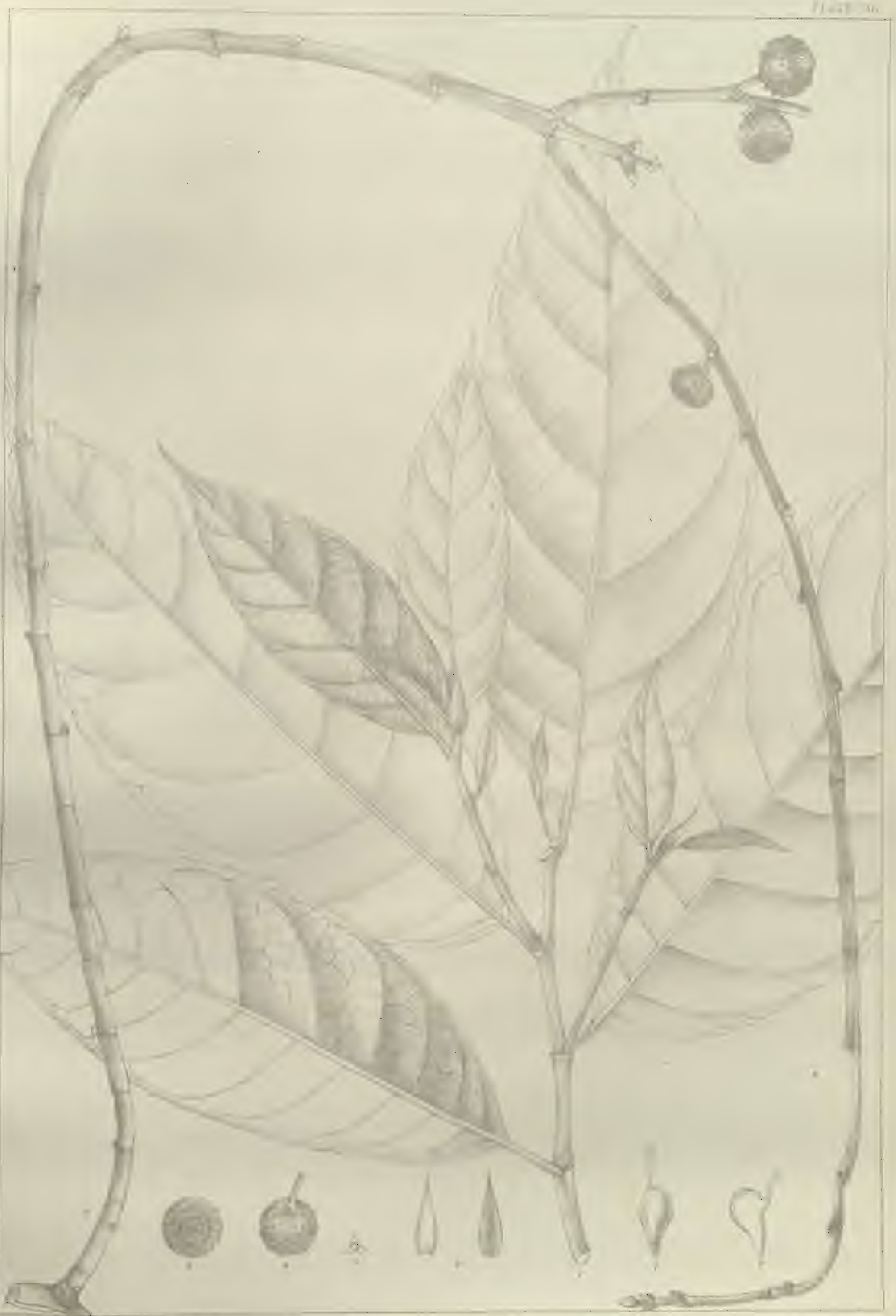
FICUS [illegible]



G.C.Das del. Bot. Garden Calcutta

Lith by J.C. Chuckerbutty Govt. School of Art Calcutta.

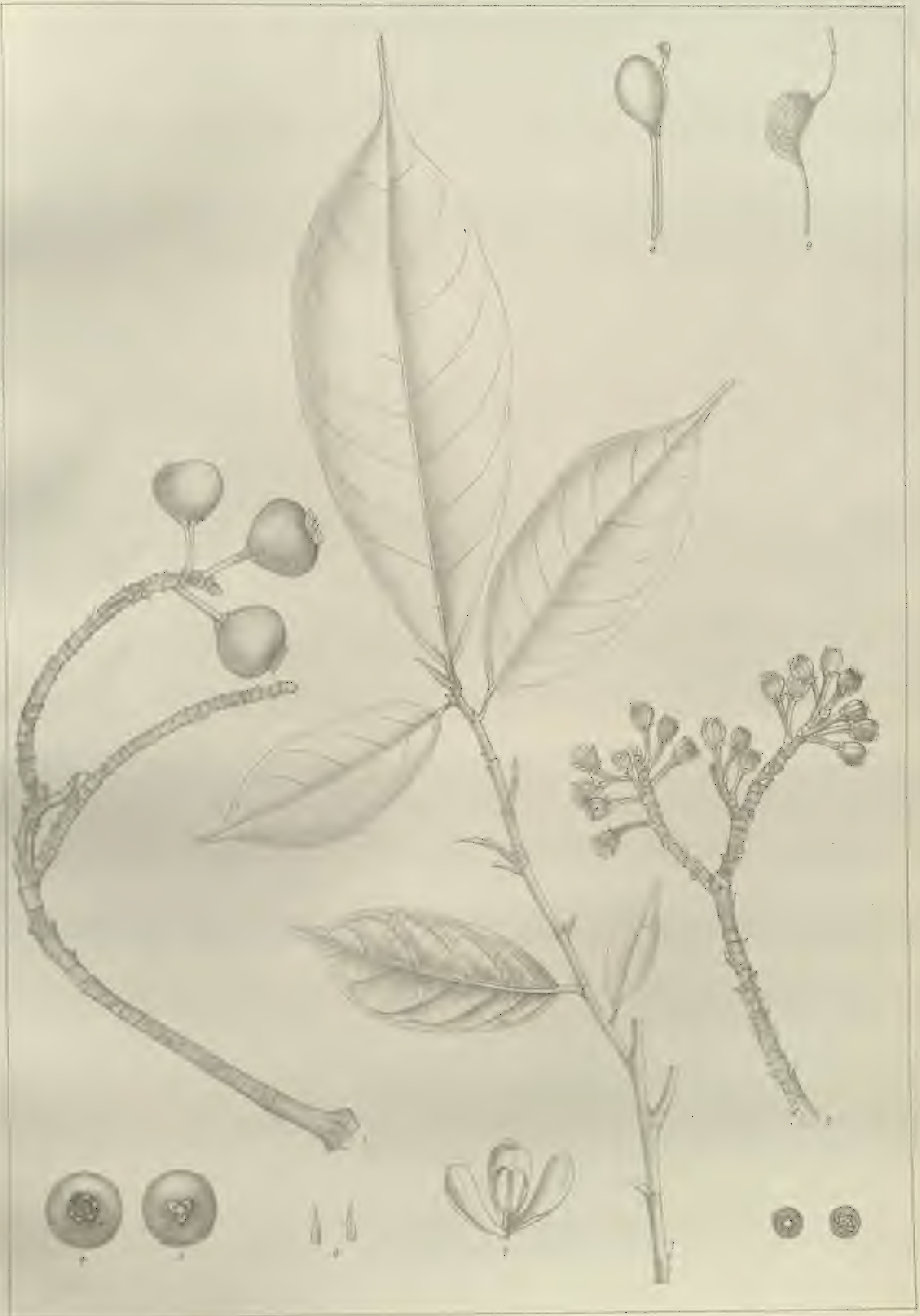
FICUS PROSTRATA, Wall.



G. [illegible] del. [illegible]

Lith. by [illegible]

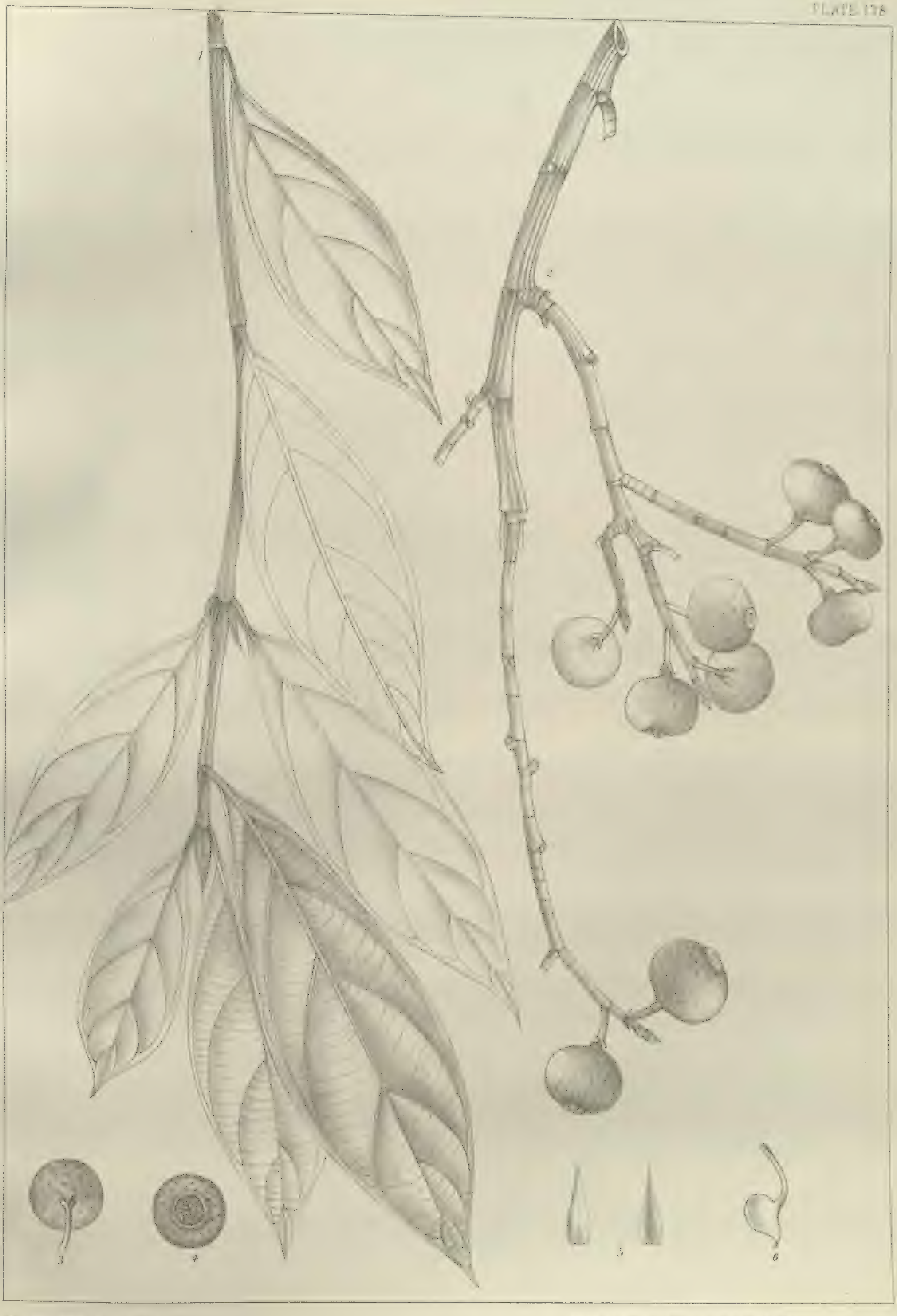
FICUS BRACHIATA, King.



[illegible]

[illegible]

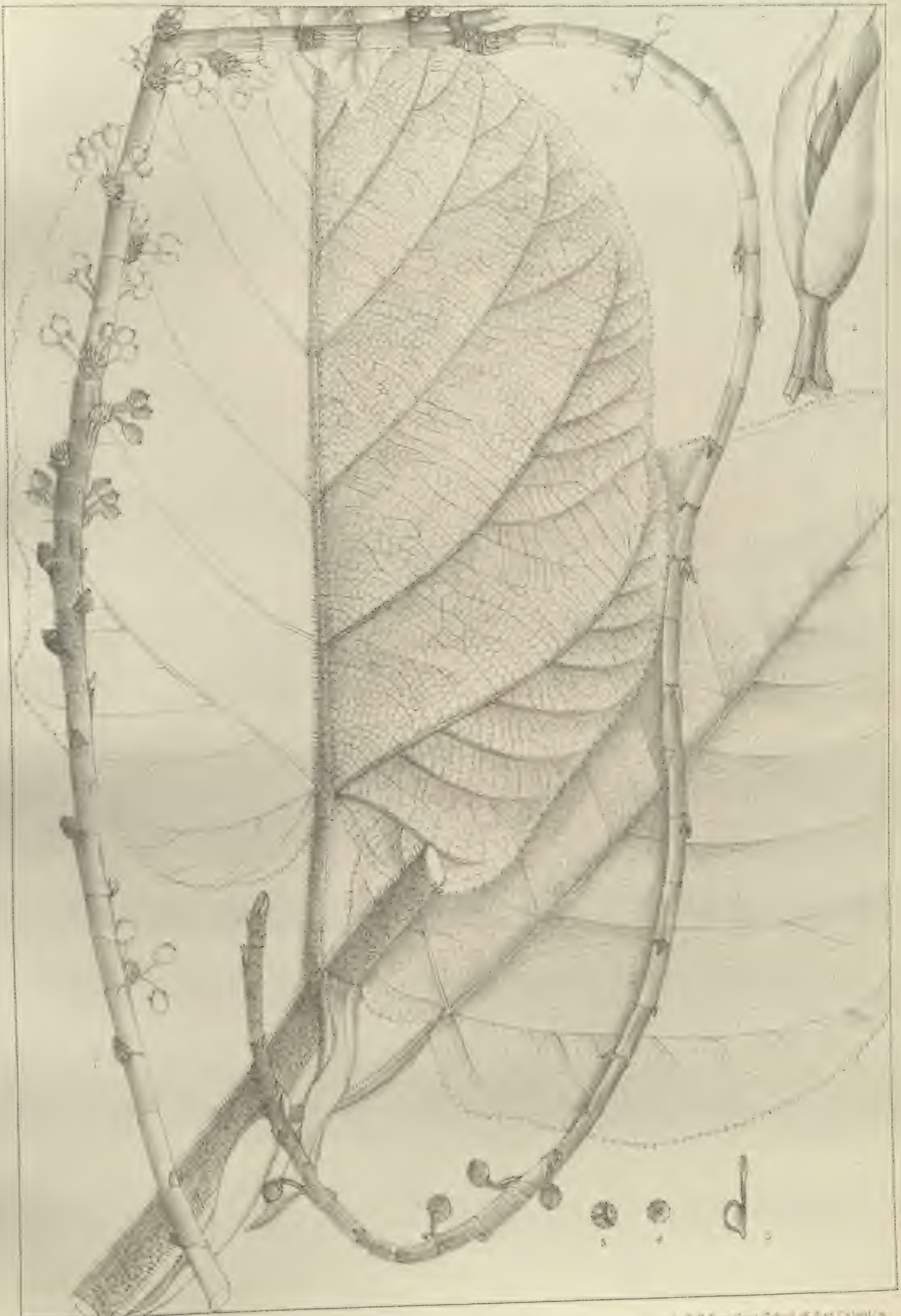
FICUS MIQUELII, King.



G. C. Das del. Bot. Garden Calcutta

Lith. by J. C. Chunder [illegible] School of Art, Calcutta

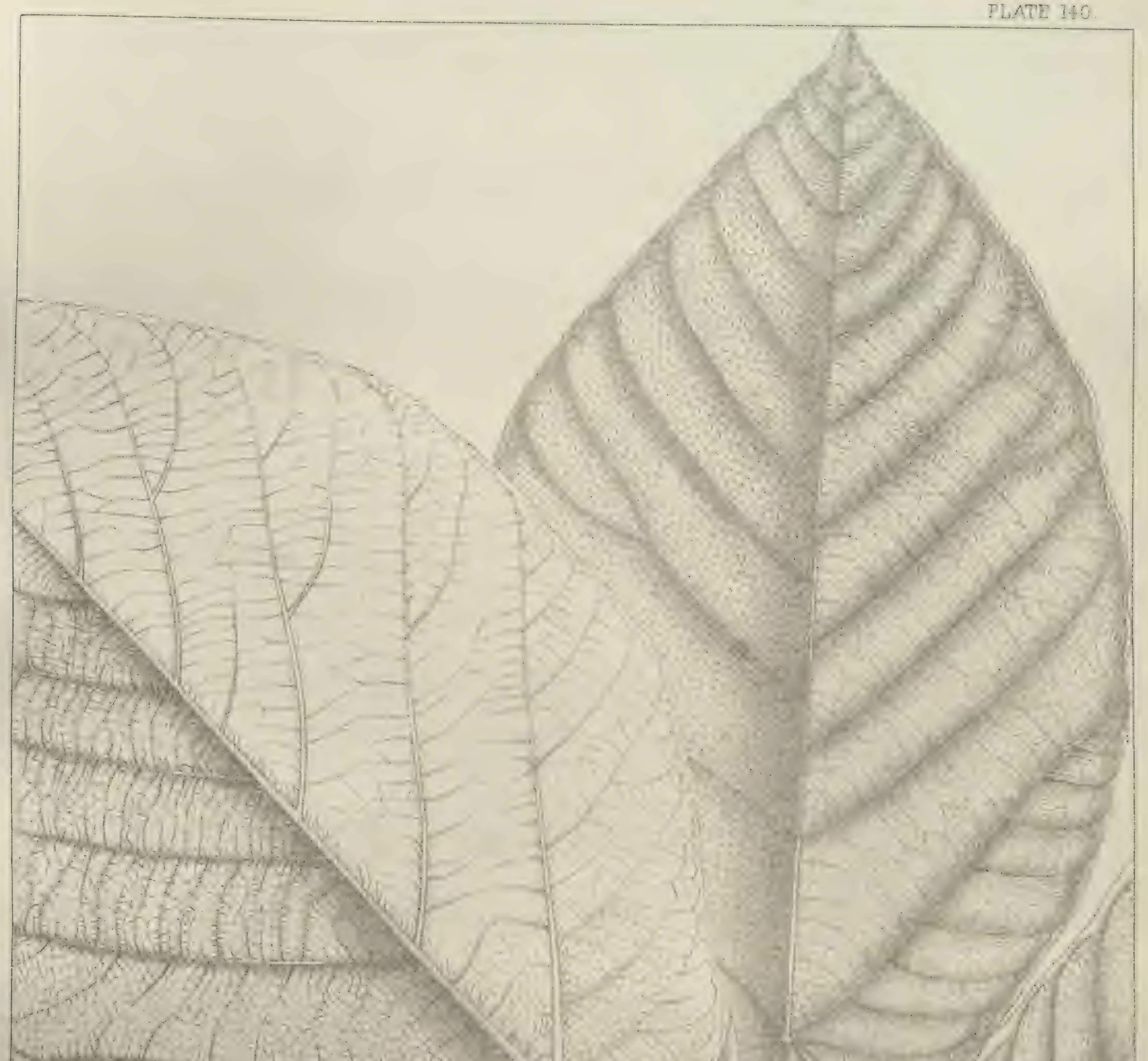
FICUS BOTRYOCARPA, Miq.



G. C. Dass del. Bot. Garden, Calcutta.

Lith. by B. F. Ray, Govt. School of Art, Calcutta.

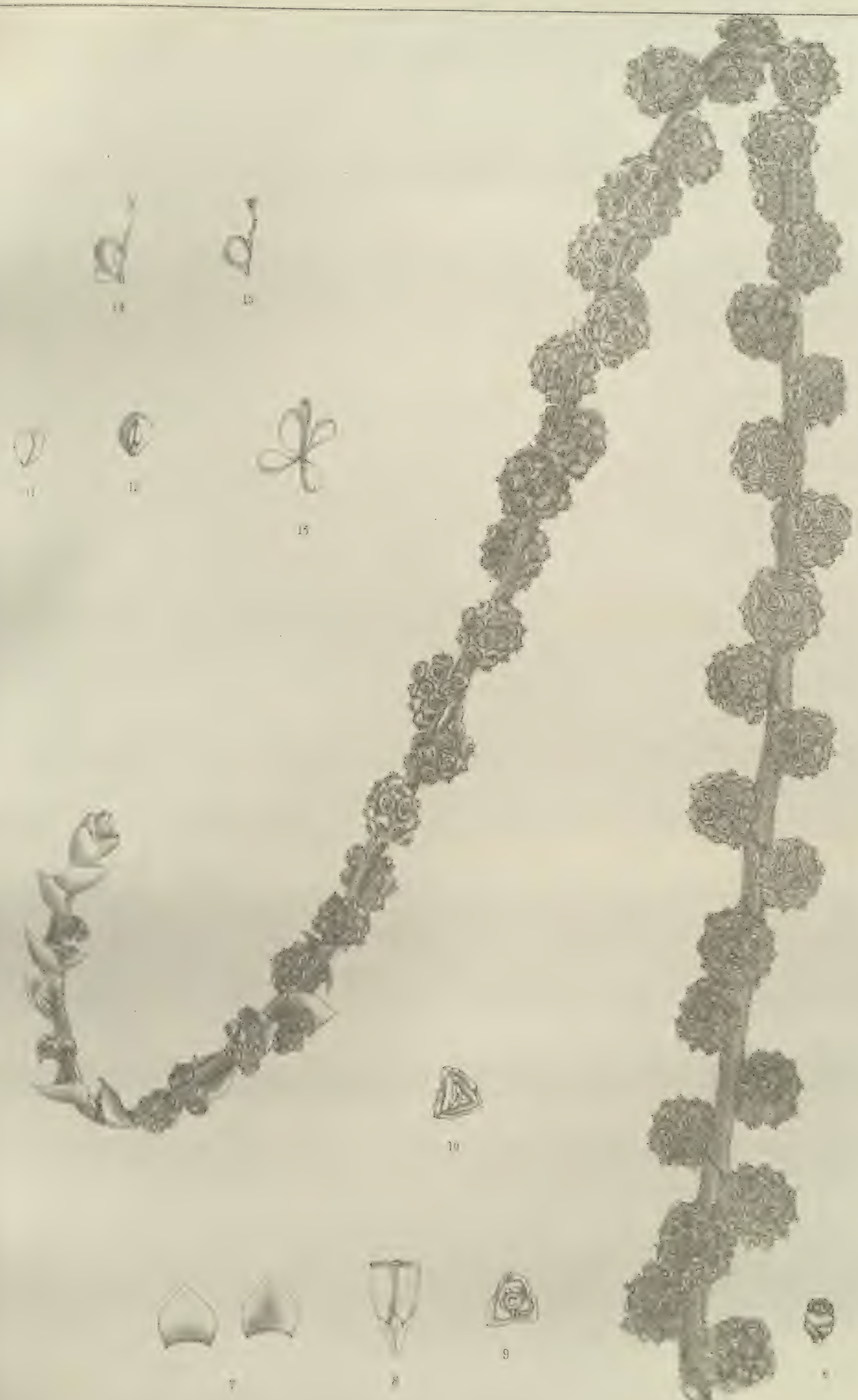
FICUS MYRIOCARPA, Miq



G. C. Das, del. Bot. Garden. Calcutta.

Lith. by S. P. Mukerji, Govt. School of Art, Calcutta.

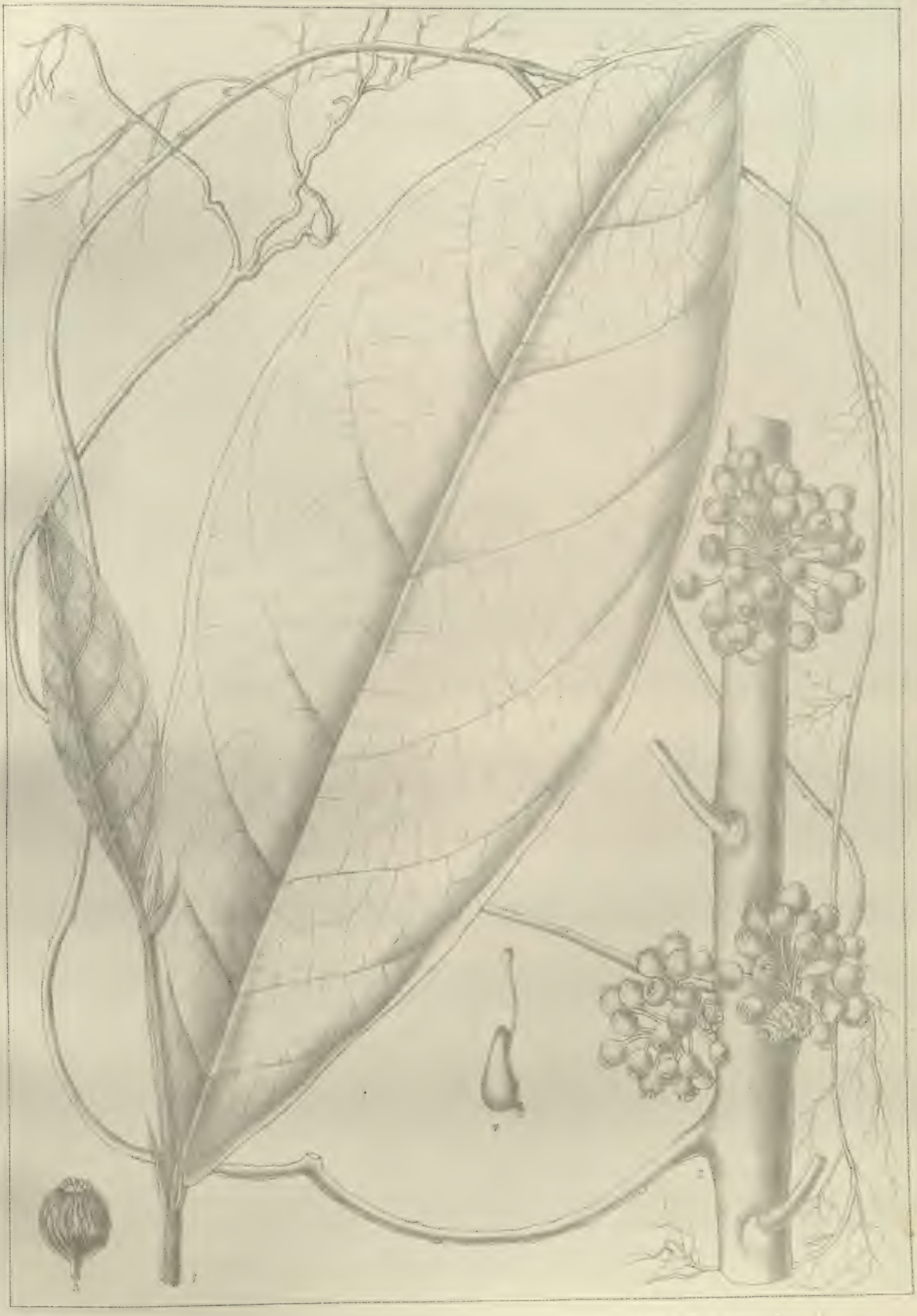
FICUS MINAHASSAE, Miq.



G. C. Dee del. Bot. Garden Calcutta.

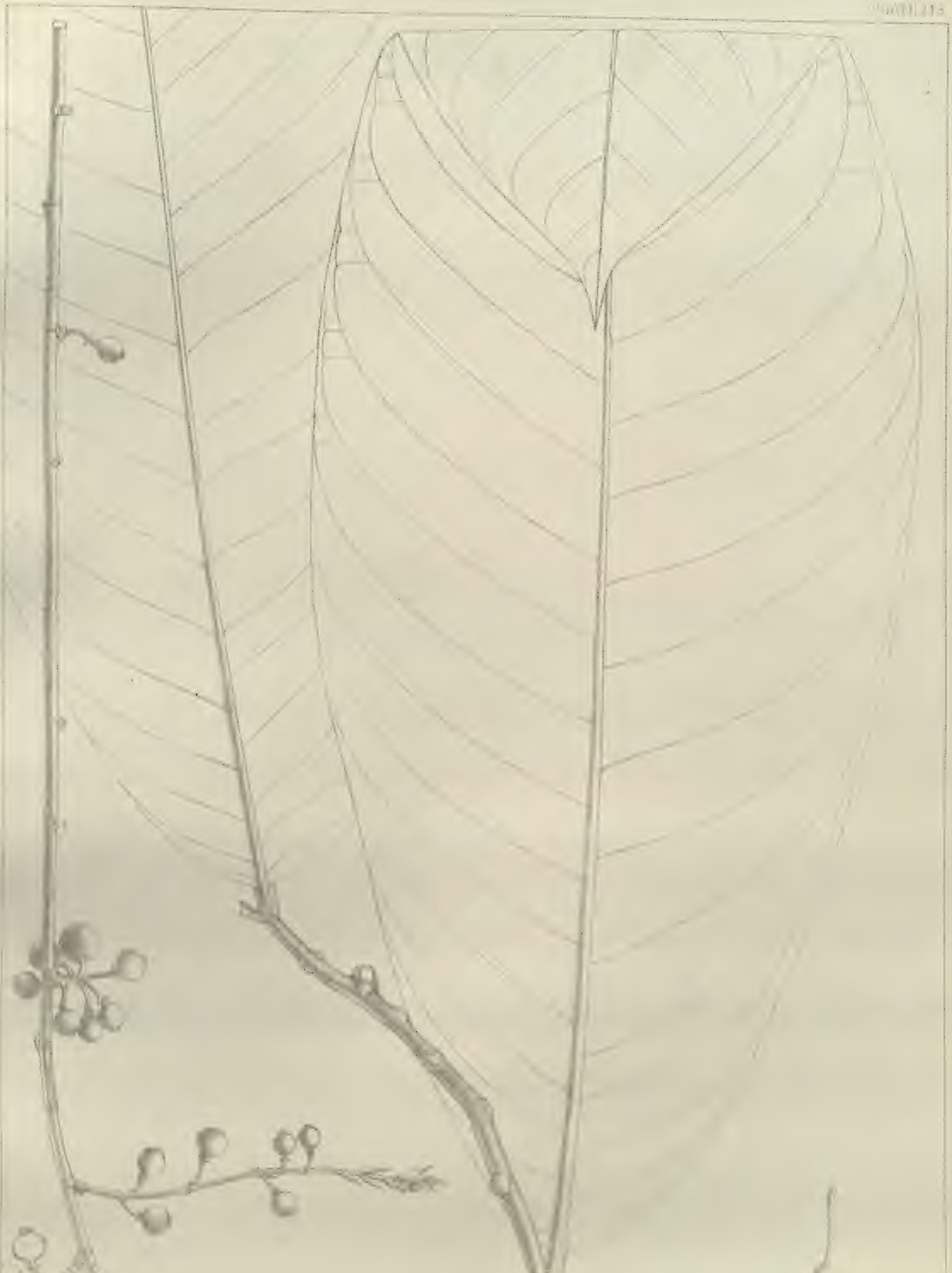
Lith. by S. P. Mukerji, Govt. School of Art, Calcutta.

FICUS MINAHASSAE, Miq.



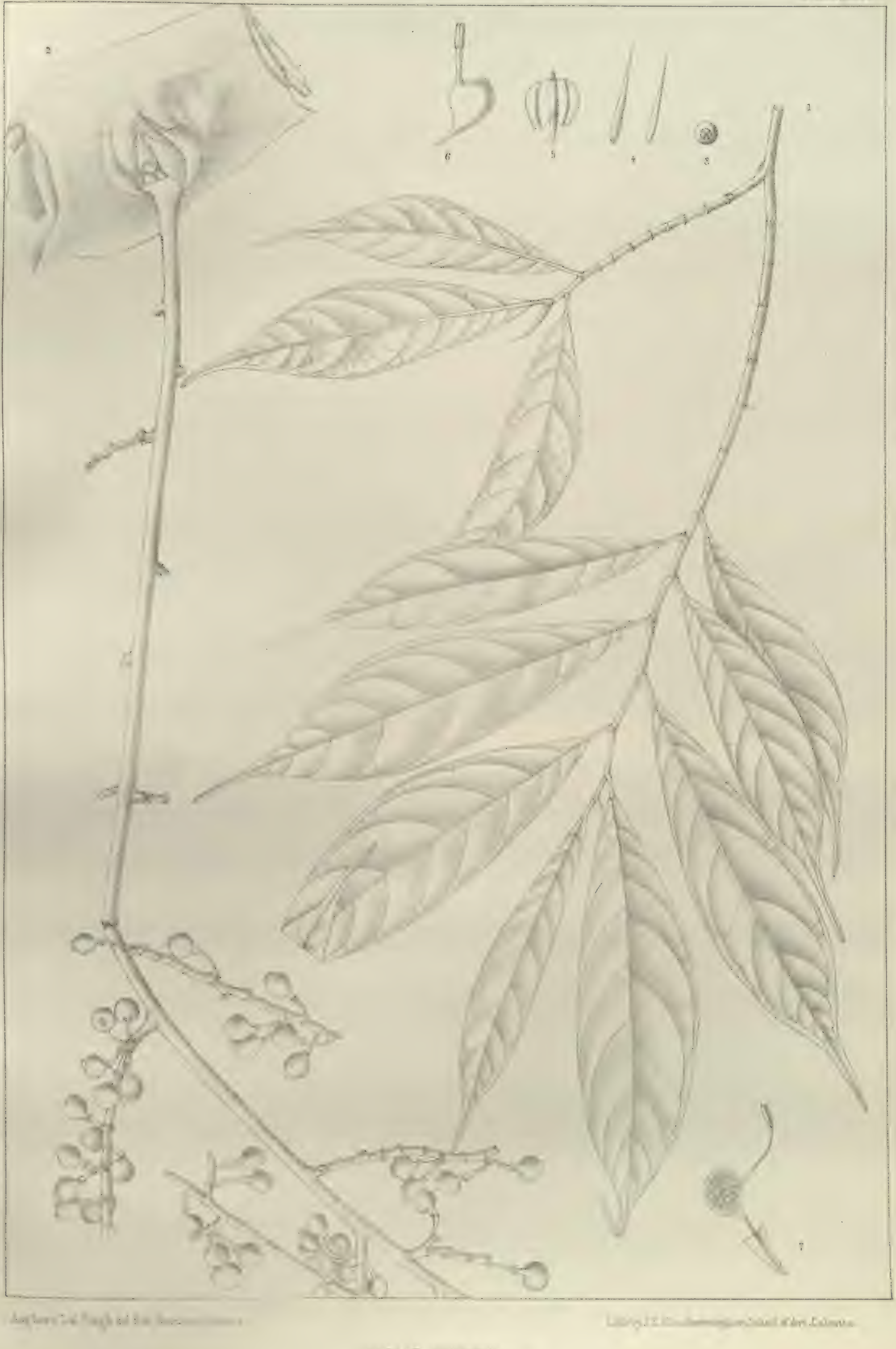
[illegible] [illegible]

[illegible]



FICUS FORBESII, King.

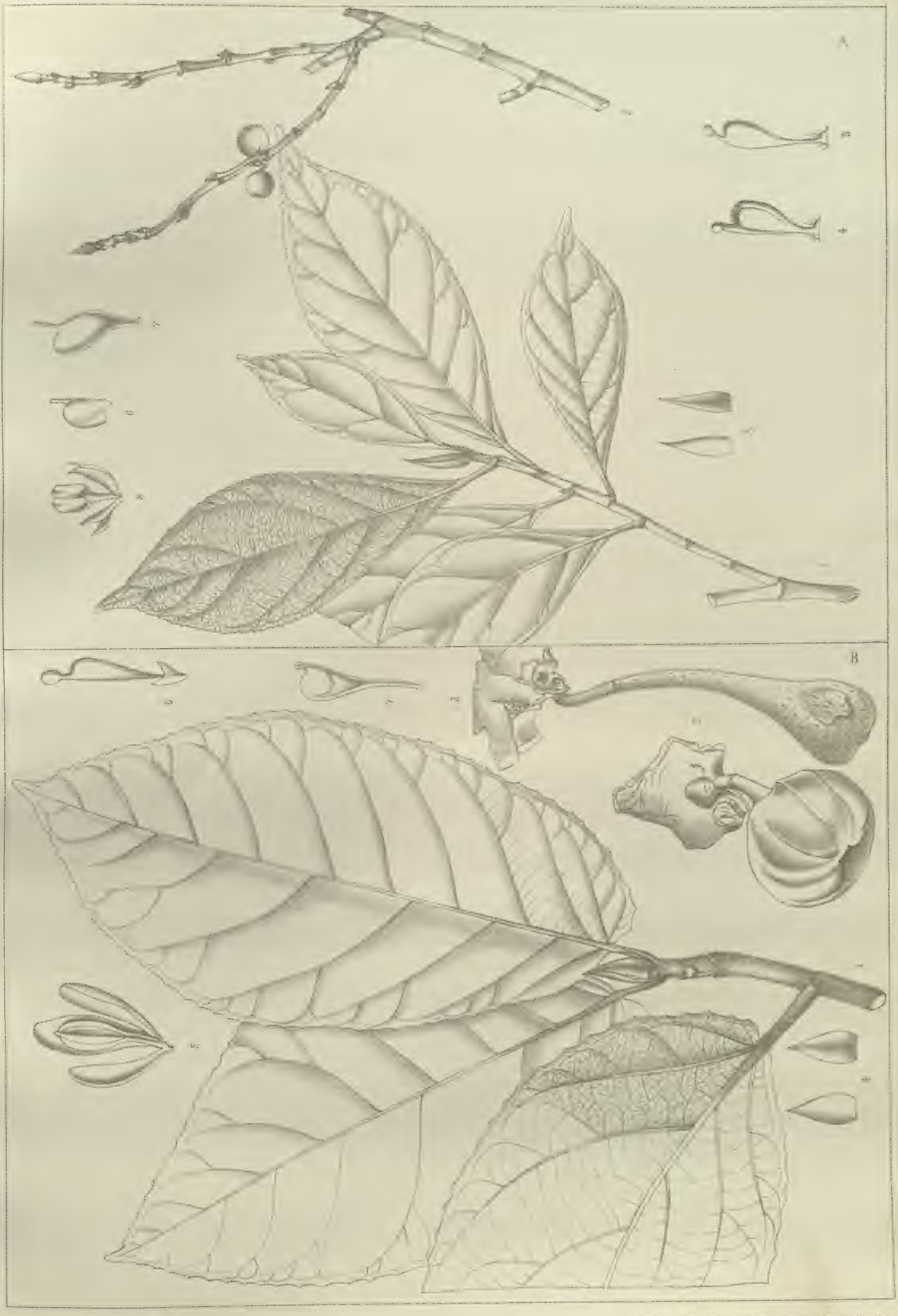
PLATE 144.



[illegible] del.

Lith. by [illegible] School of Art, Calcutta.

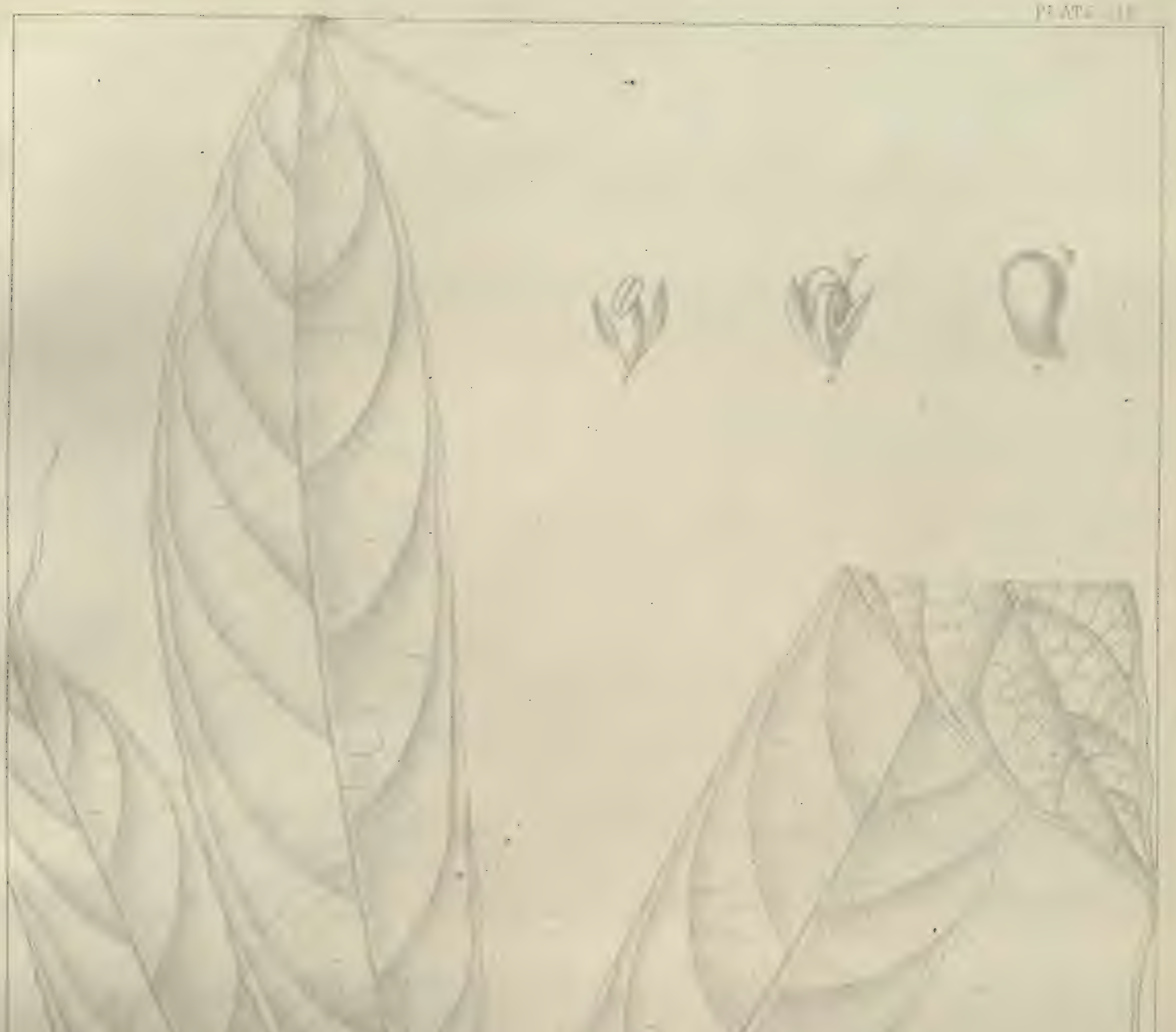
FICUS HIRTA, Vahl.



G. C. Das, del. Bot. Garden, Calcutta.

Lith. by H. C. Ghosal, Govt. School of Art, Calcutta.

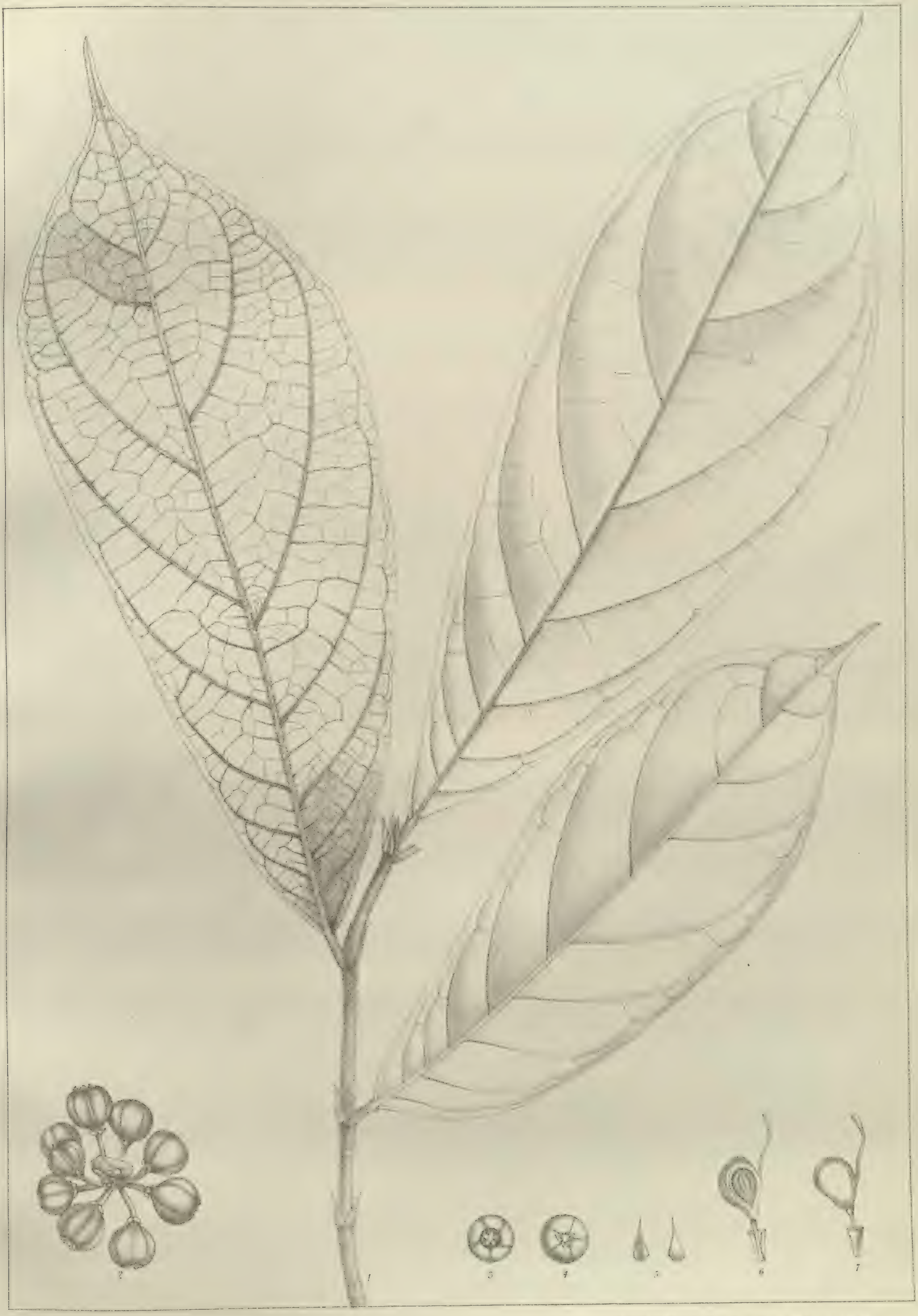
A. FICUS CUNEATA, Miq.
B. „ DIMORPHA, King.



[illegible]

[illegible]

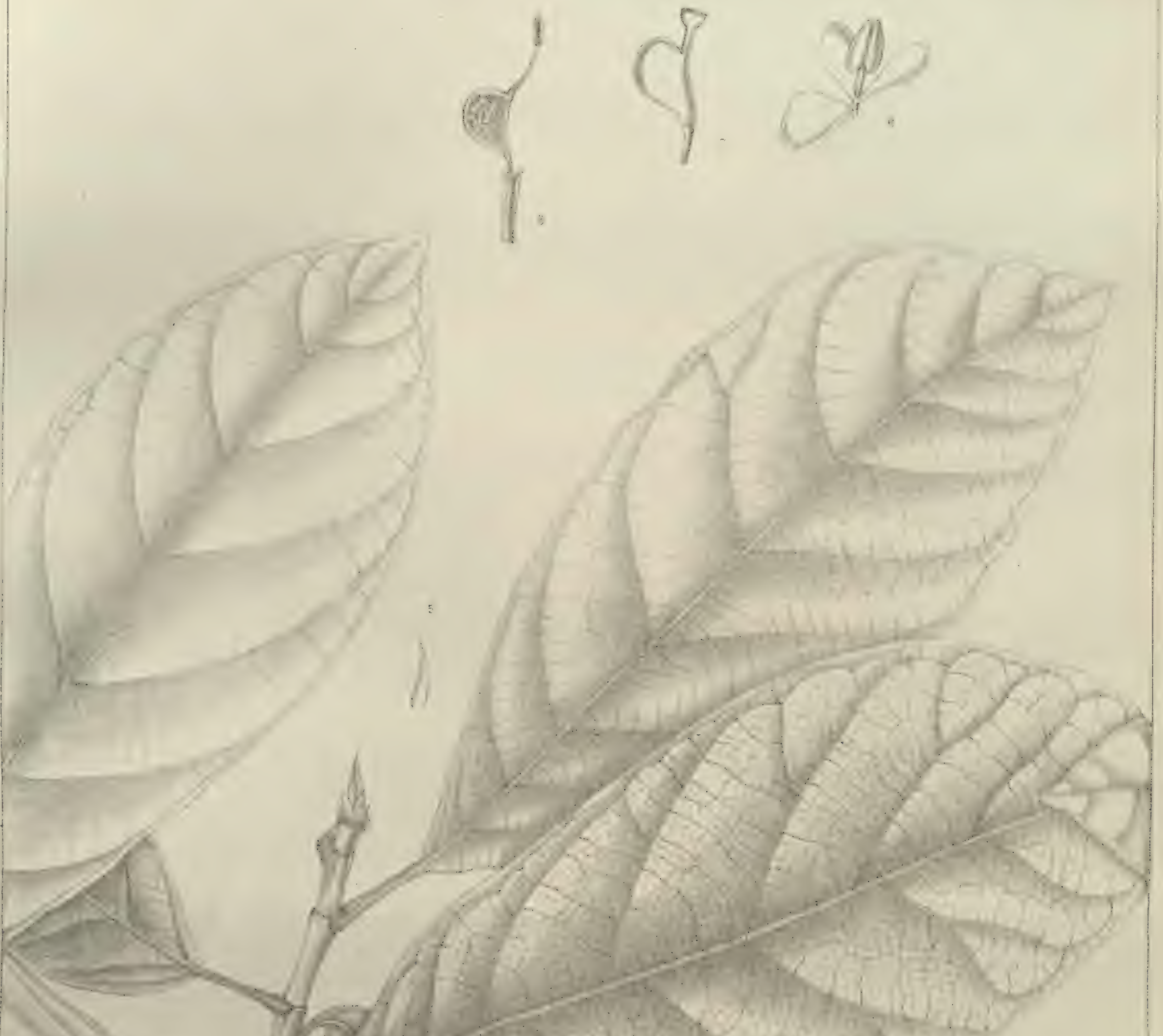
UVARIA HEMSLEYANA, King



G. C. Das del. Bot. Garden Calcutta.

Lith. by J. C. Chuckerbutty, Govt. School of Art, Calcutta.

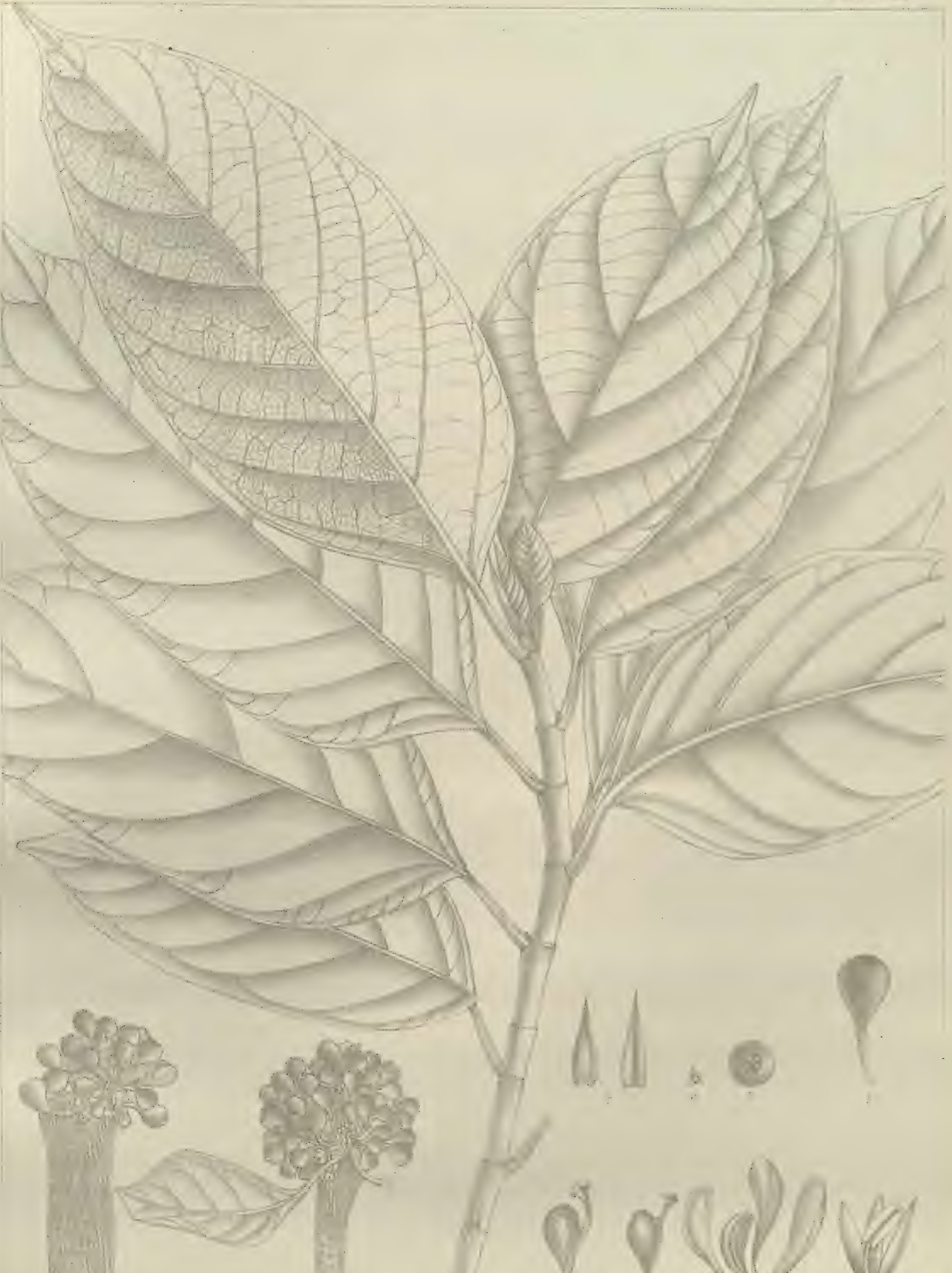
FICUS SCORTECHINII, King.



G. C. Das del. [illegible]

Lith. by S. P. Mukerji, Govt. School of Art, Calcutta.

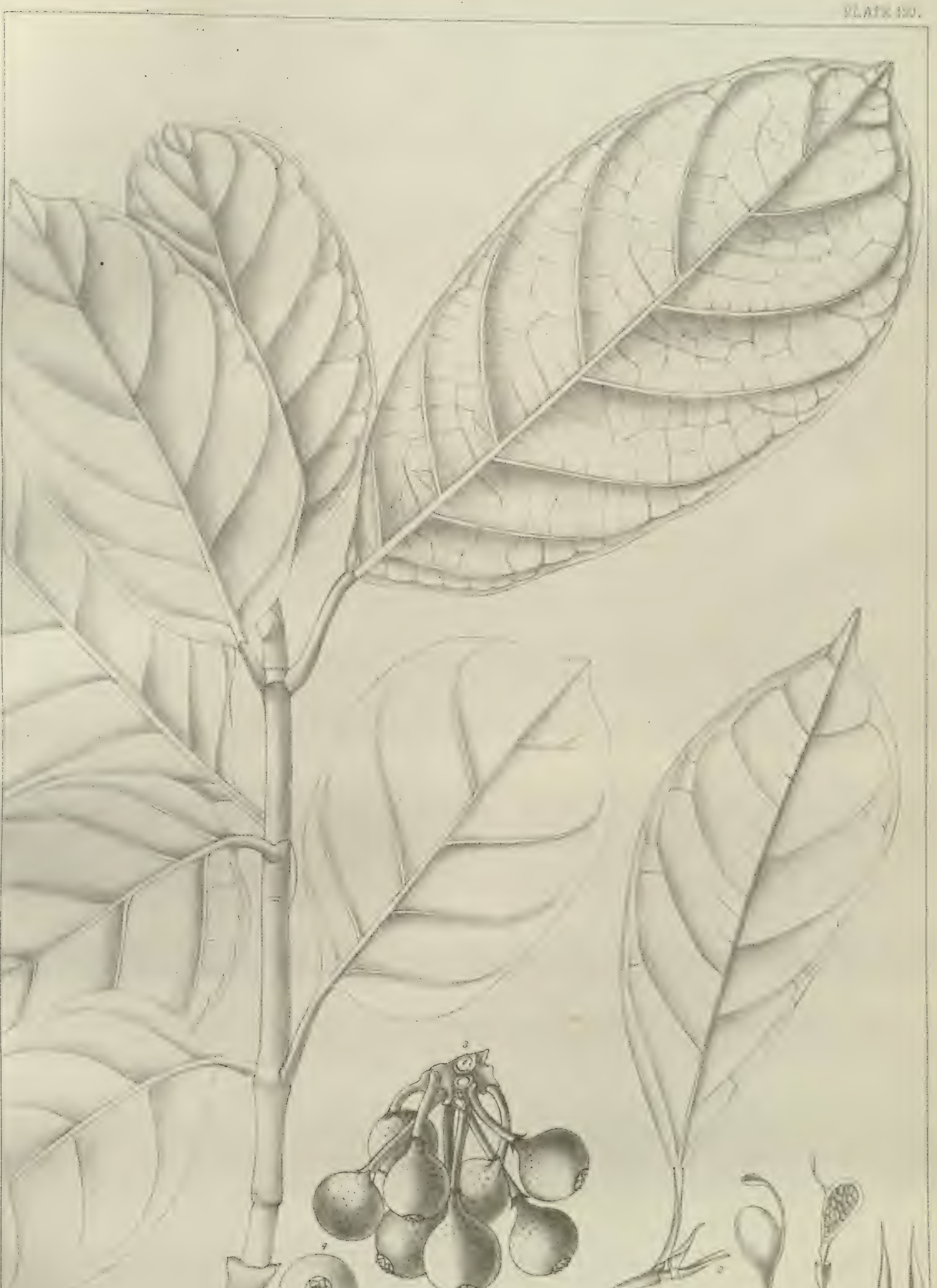
FICUS HARLANDI. Benth.



G. C. Das del. Bot. Garden Calcutta.

Lith. by J. G. Chuckerbutty, Govt. School of Art, Calcutta.

FICUS CONDENSA, King.

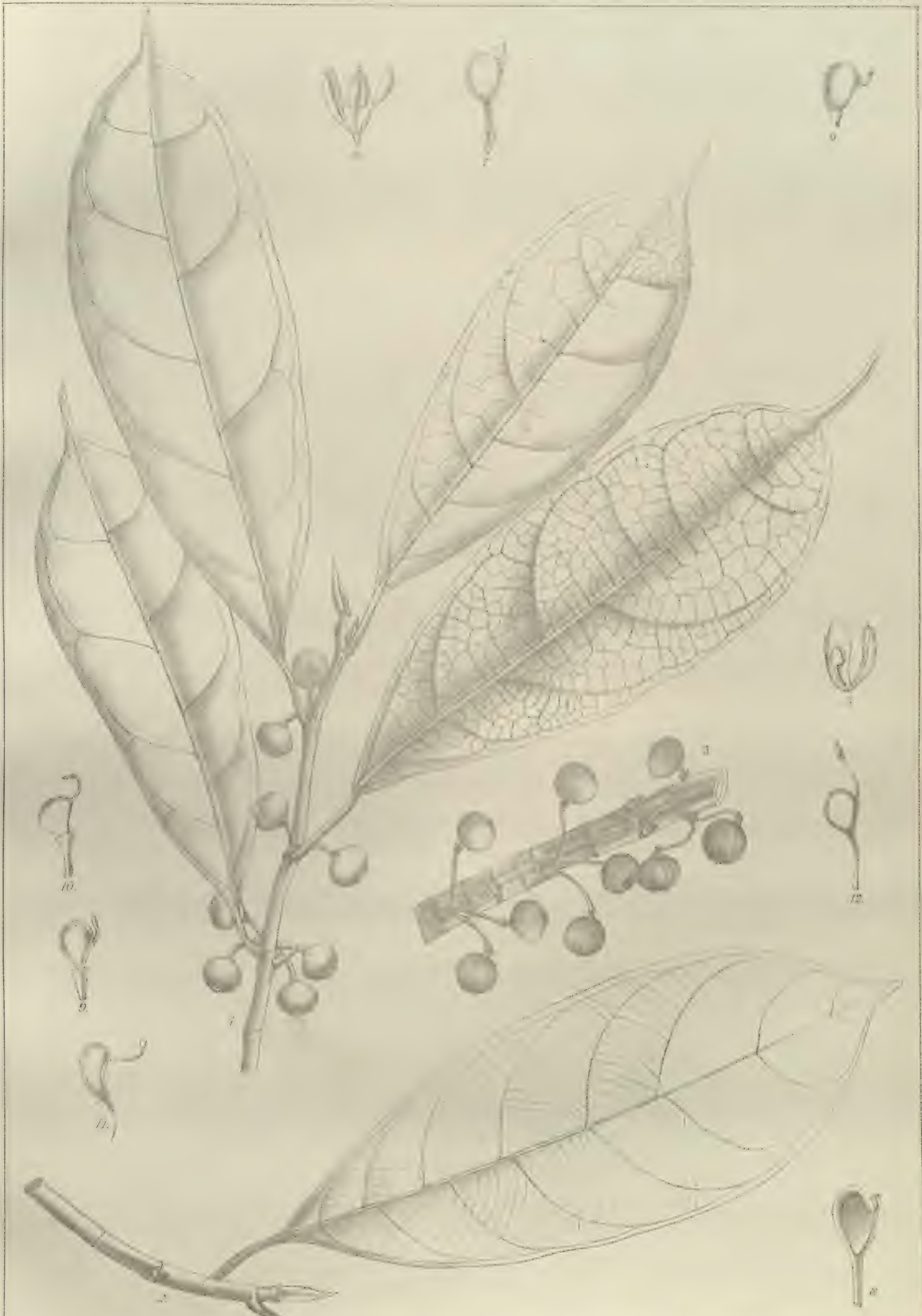


G. C. Das del. Bot. Garden, Calcutta.

Lith by J. C. Chuckerbutty, Govt. School of Art, Calcutta.

FICUS FISTULOSA. Reinw.

PLATE [illegible]



G. C. Das del. Bot. Garden Calcutta.

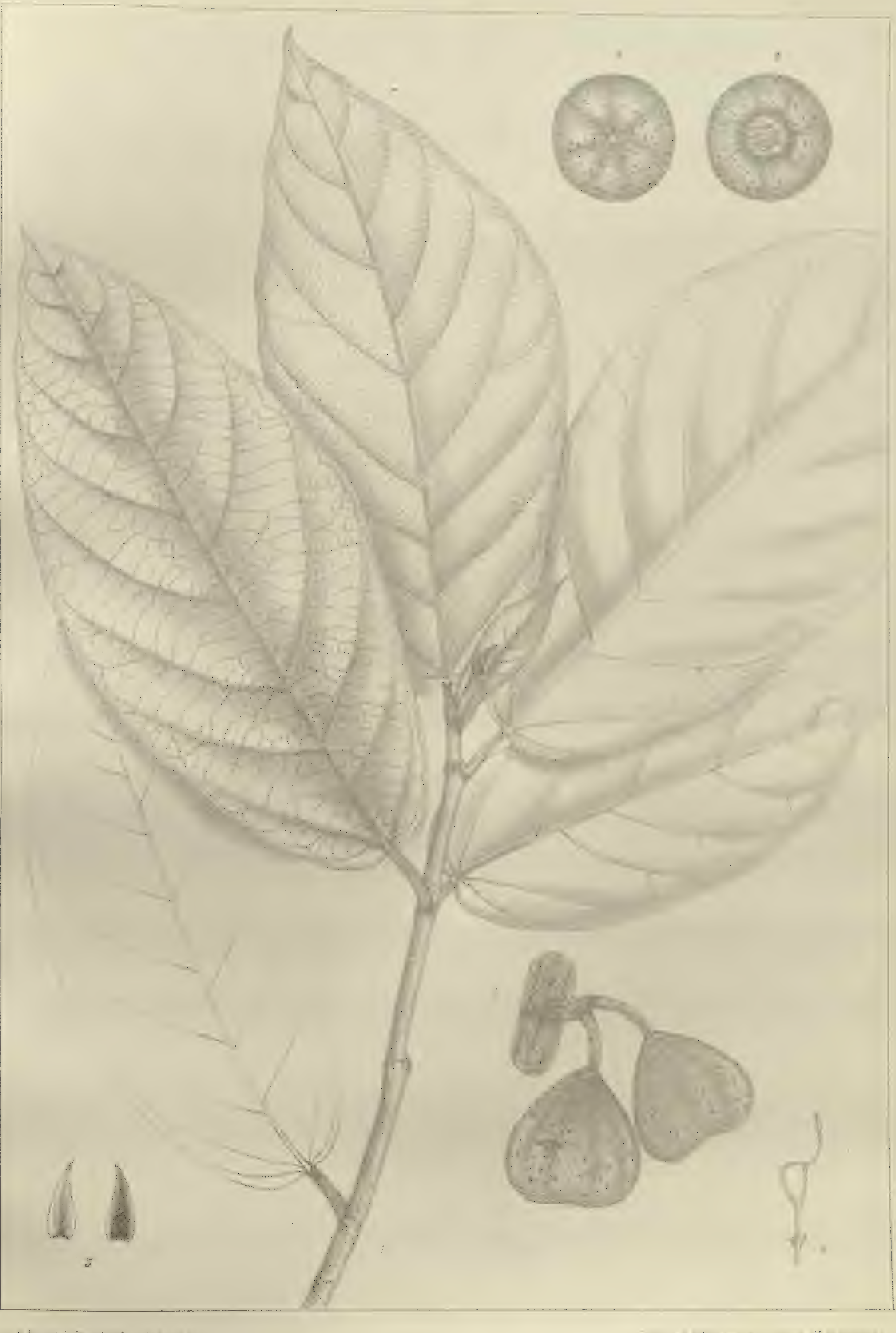
Lith. by S. I. P. O. Calcutta.

FICUS FISTULOSA, Reinw.

[illegible]

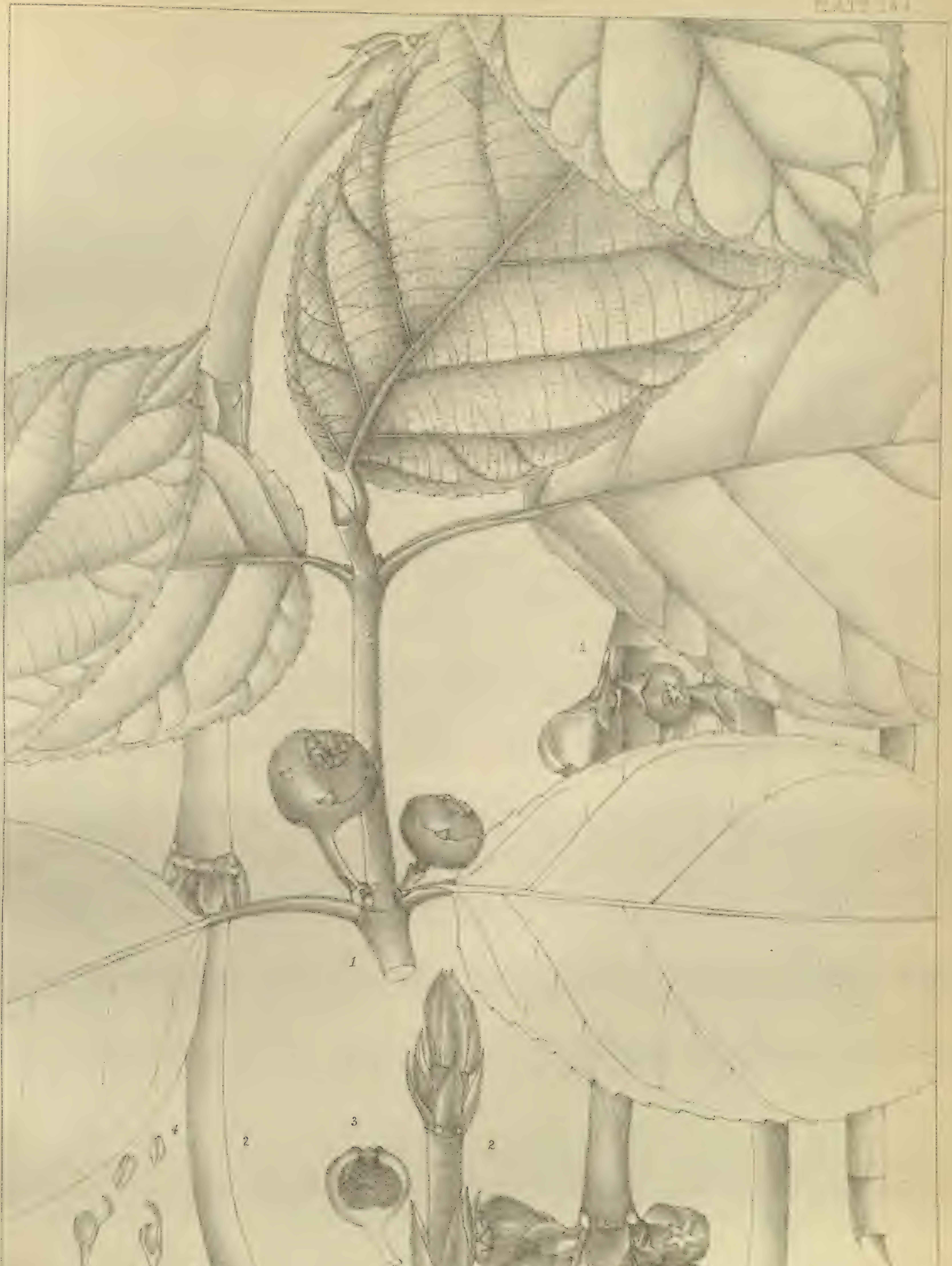
[illegible]

FICUS HAEMOCARPA, Miq.



[illegible] [illegible]

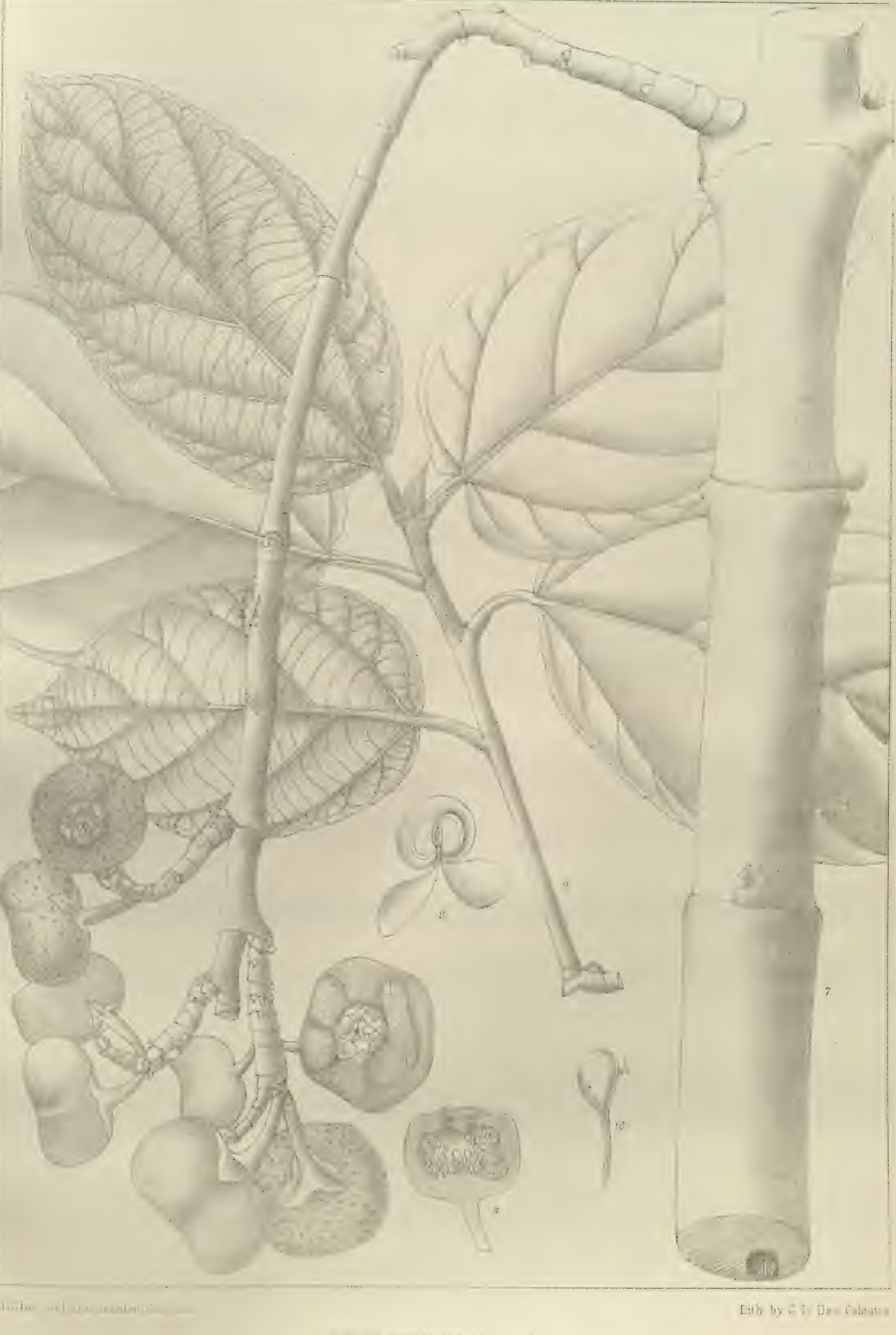
FICUS [illegible]



G. C. Das del. Bot. Garden, Calcutta.

Lith. by B. K. Roy, Govt. School of Art, Calcutta.

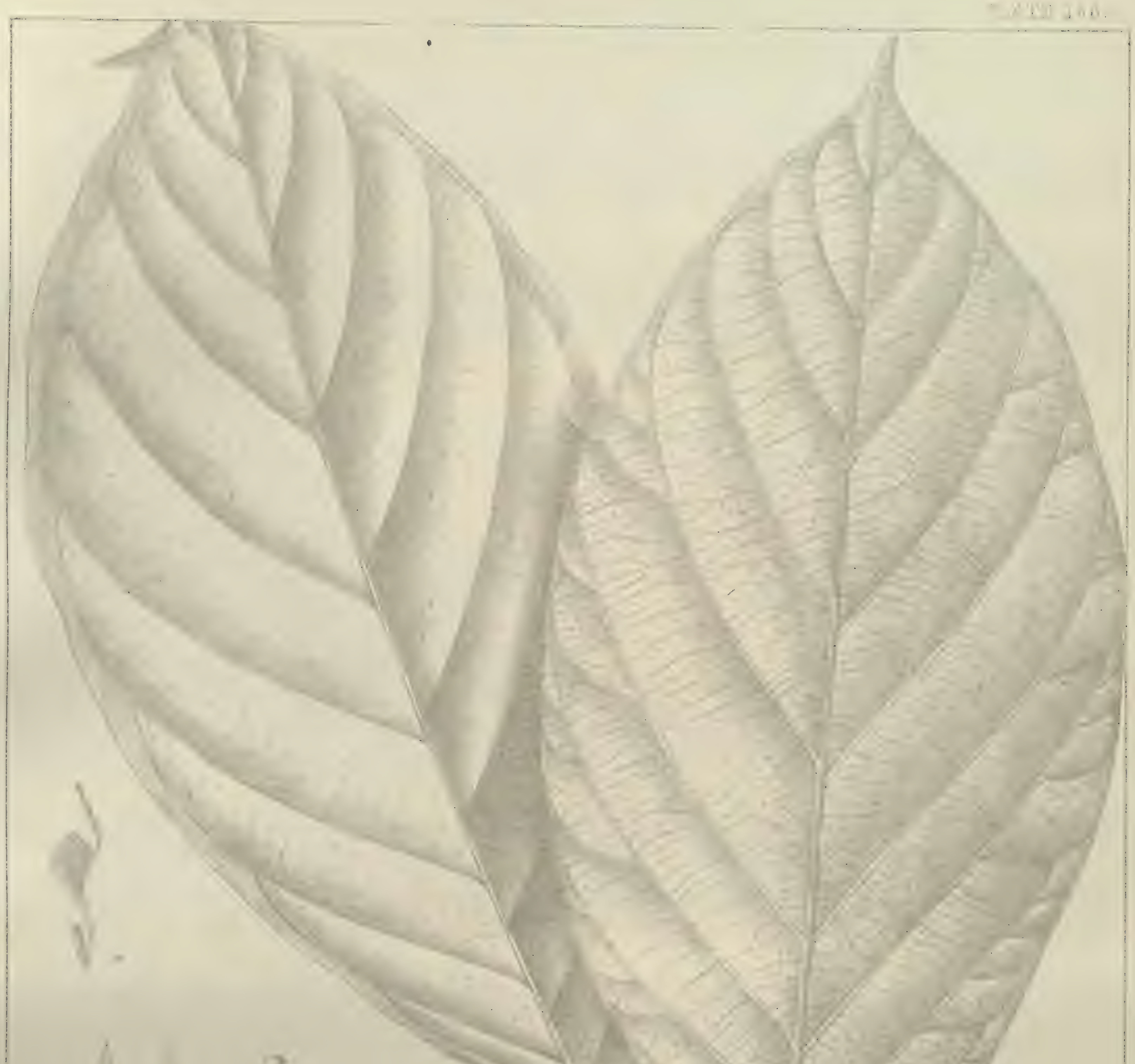
FICUS HISPIDA, Linn. Fil.



[illegible] del. [illegible]

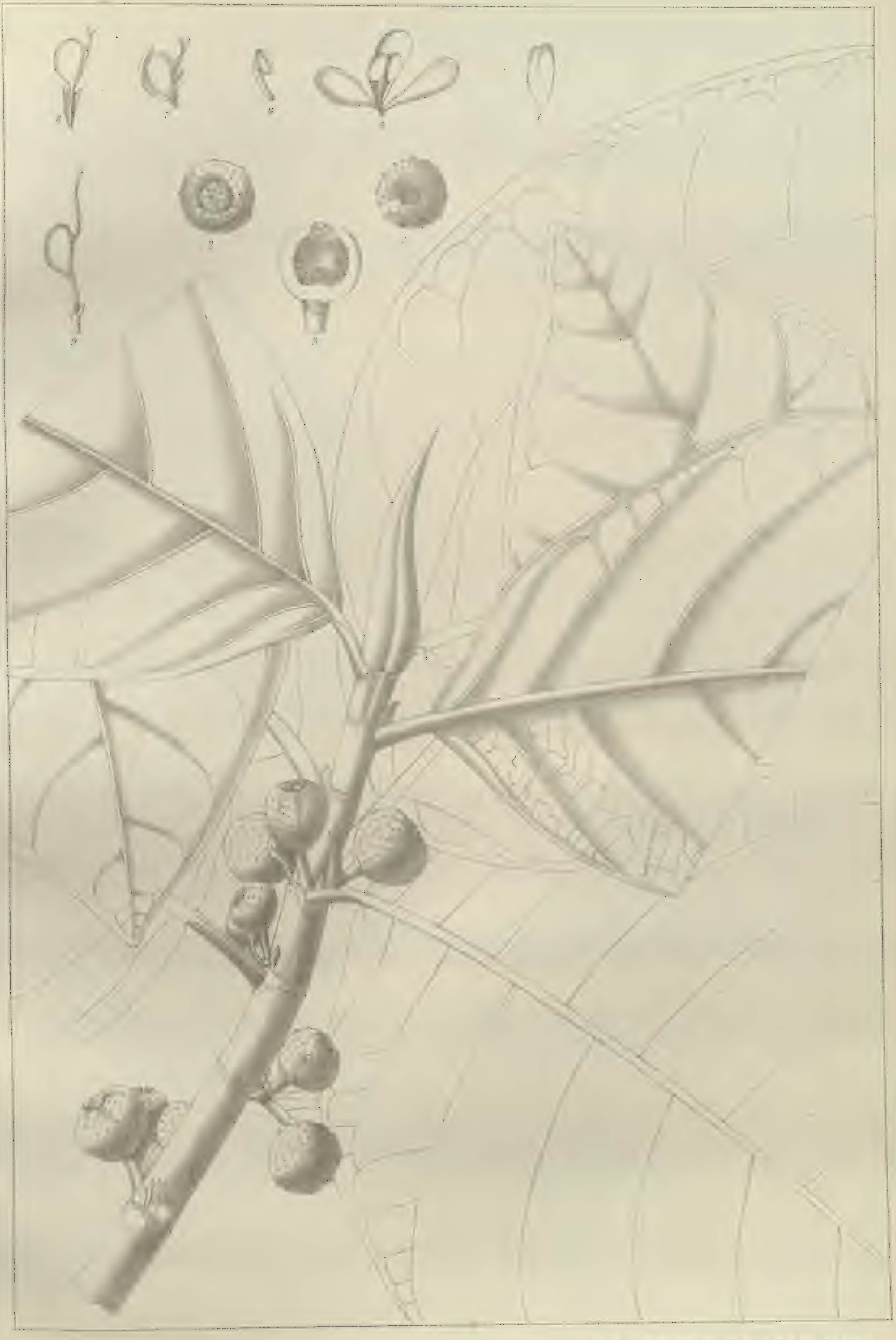
Lith by [illegible] Das Calcutta

FICUS HISPIDA, Linn. fil.



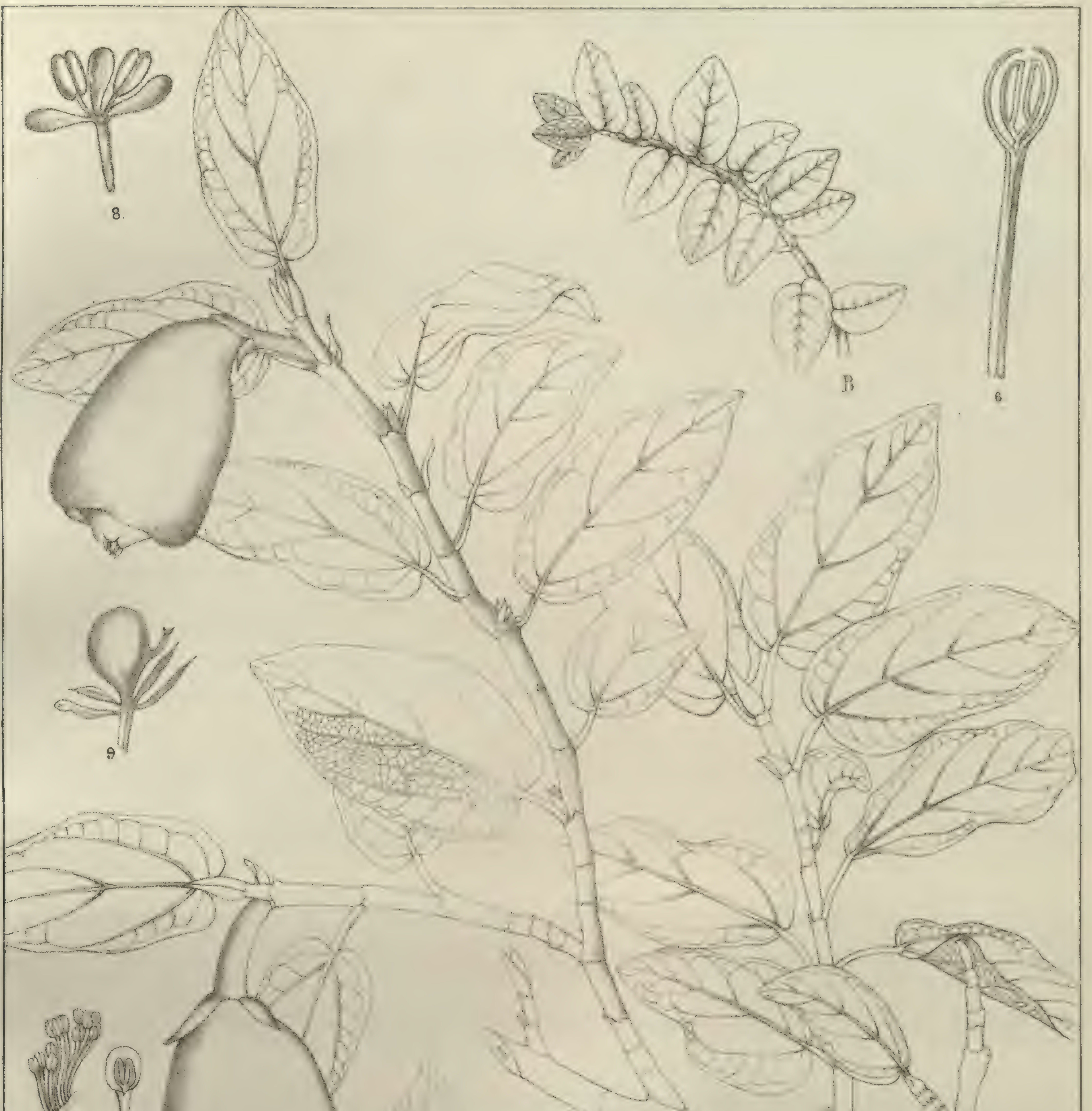
[illegible] [illegible]

[illegible]



[illegible] del. [illegible] Calcutta. Lith by [illegible] Student, Govt. School of Art, Calcutta.

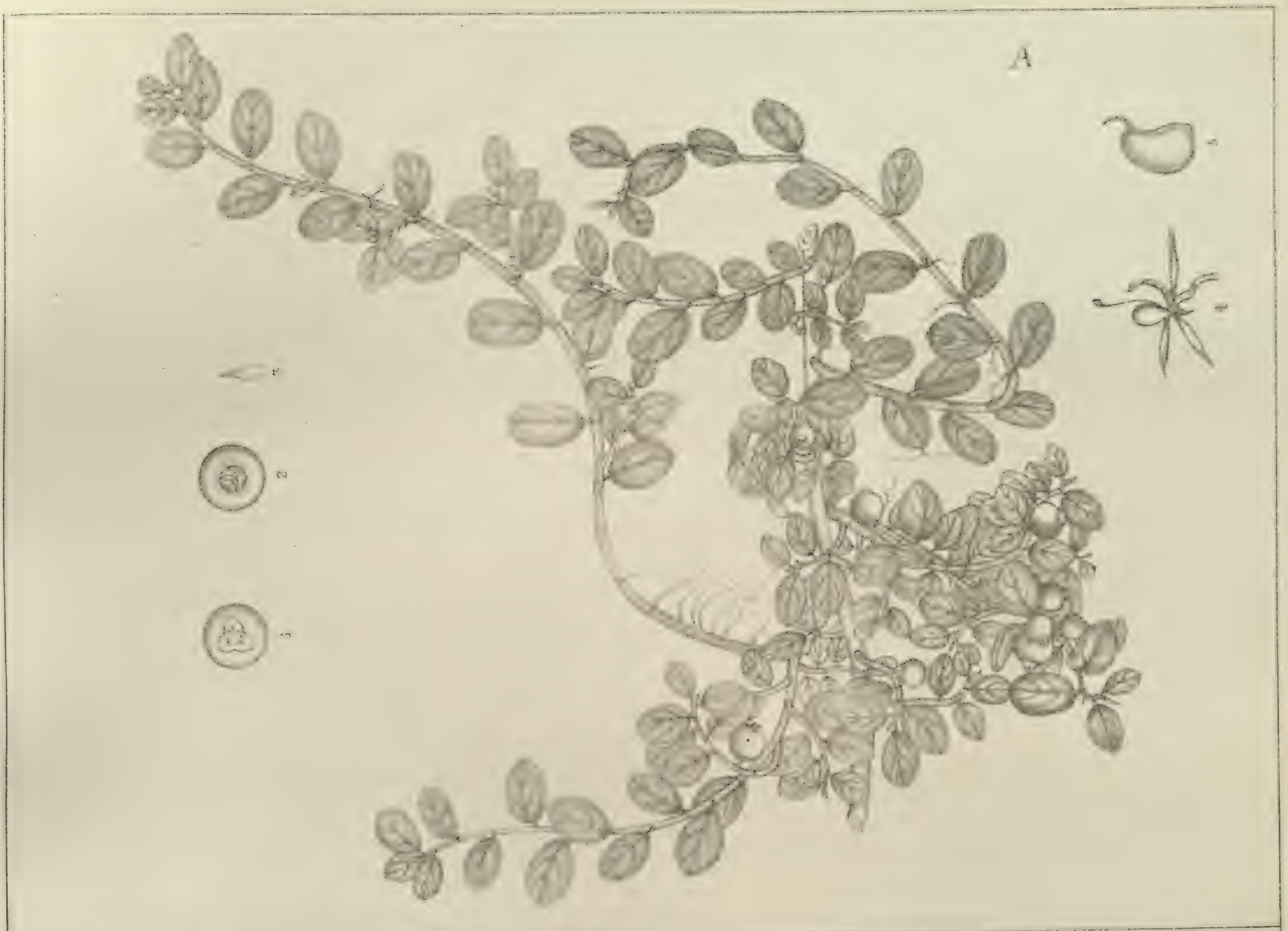
FICUS LEUCANTATOMA, Poir.

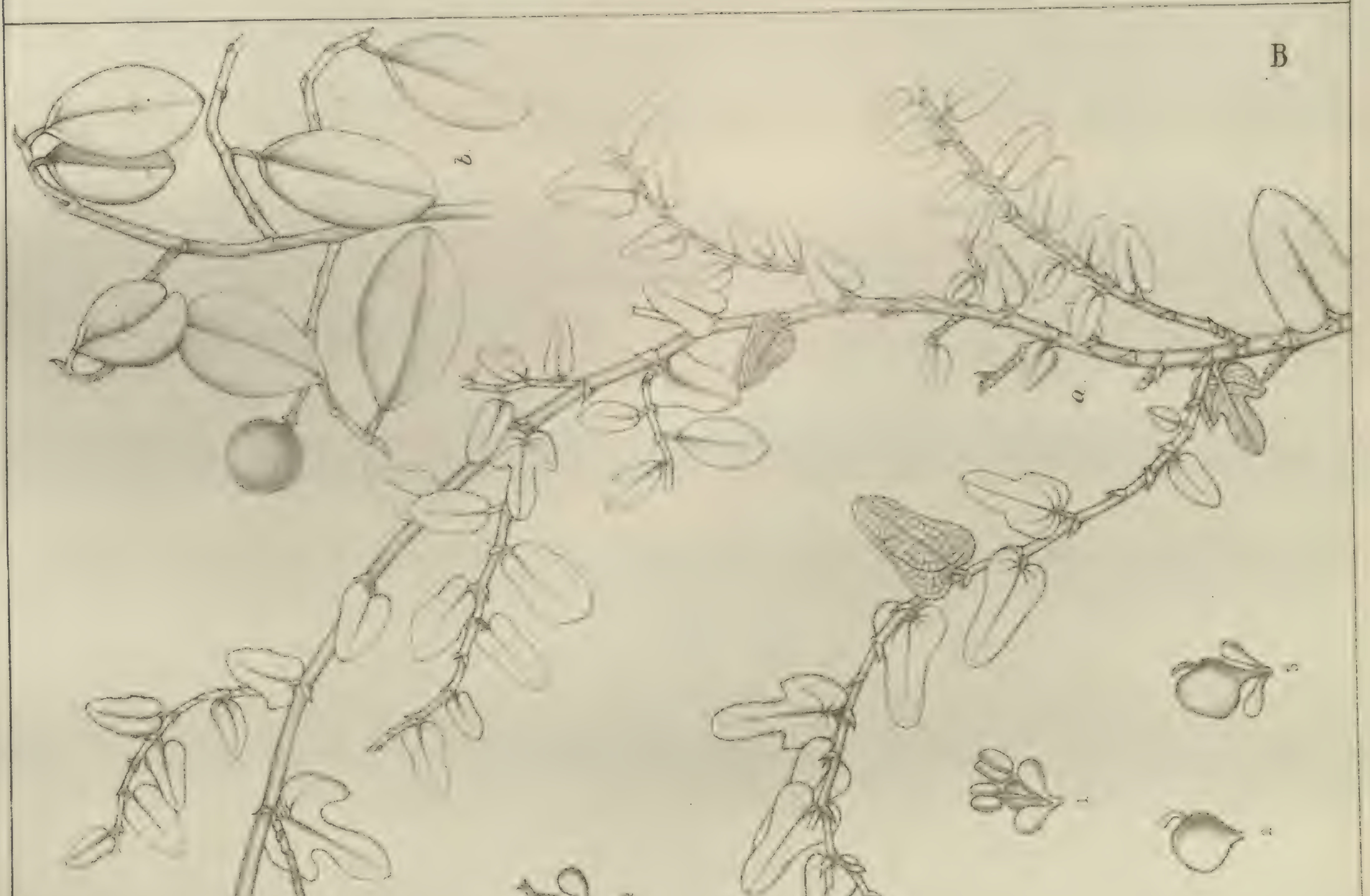


S. Abdool Mullah, del. Bot. Garden, Calcutta.

Lith. and Print by Kristohari Das.

FICUS PUMILA, Linn.



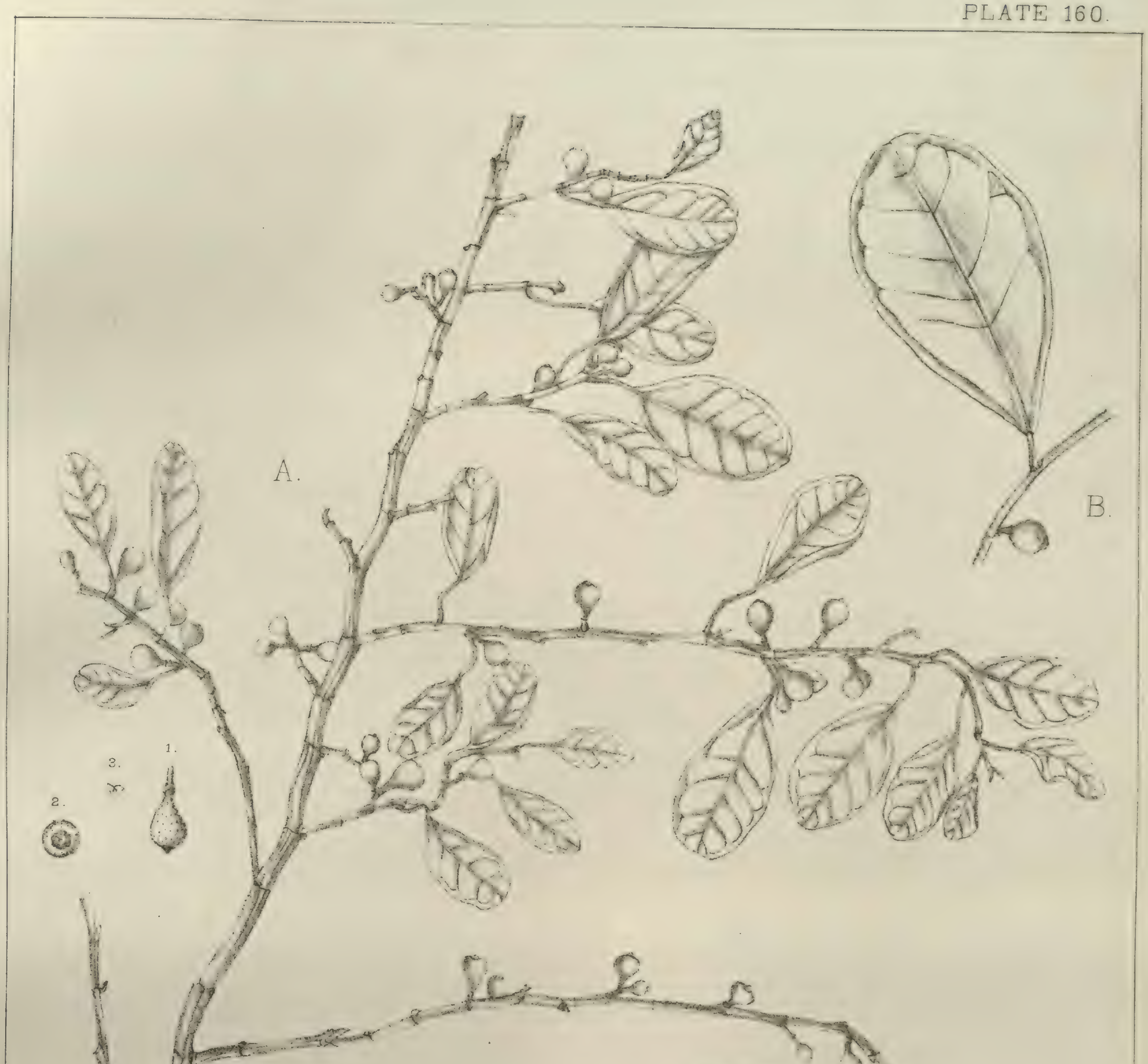


Drawn by S. Abdool Mullah, Bot. Garden, Calcutta.
Lith. and Printed by Kristohari Das

B. ~~A.~~ FICUS THWAITESII. Miq.

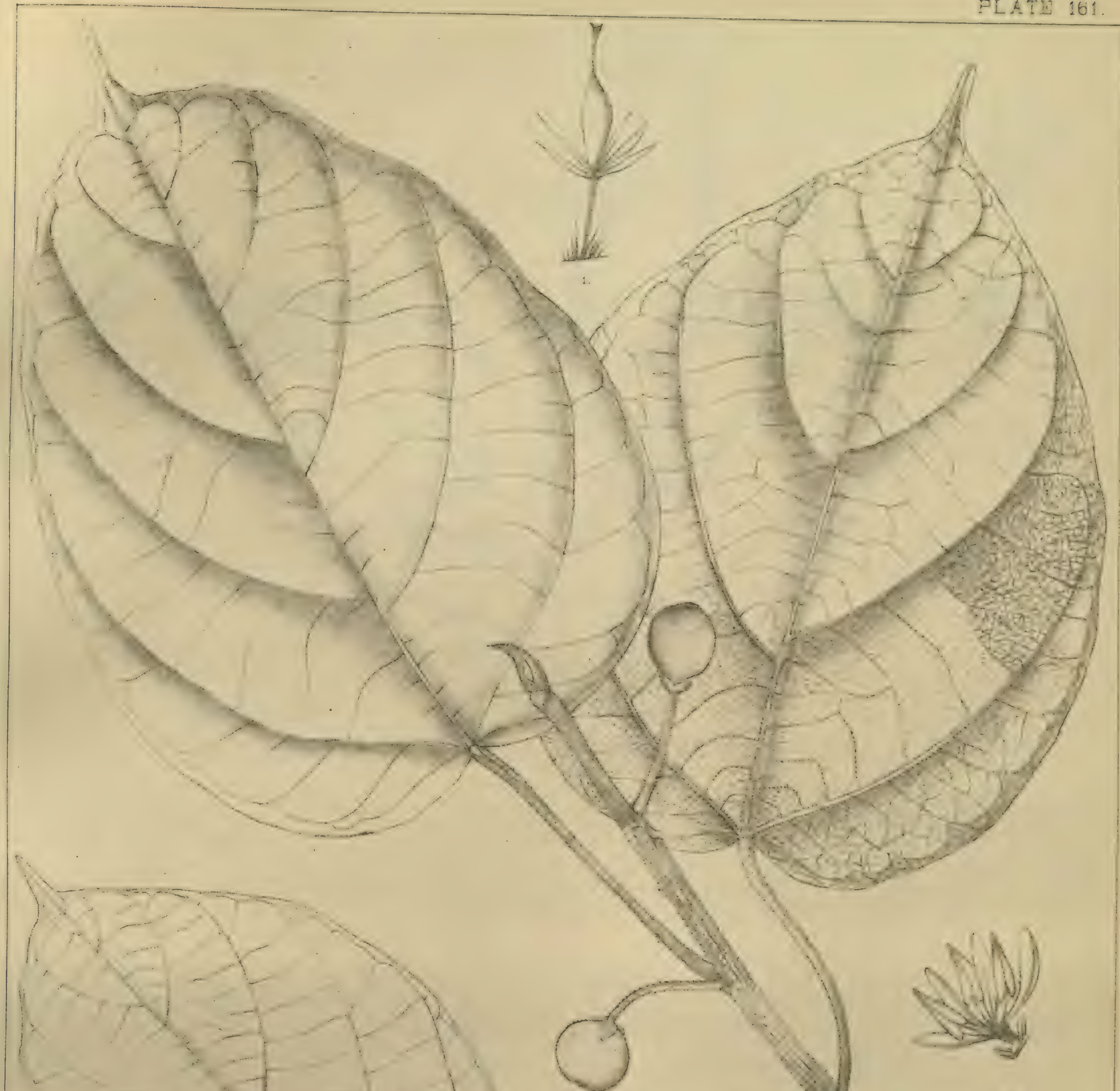
A. ~~B.~~ FICUS VACCINIOIDES. Hems & King

PLATE 160.



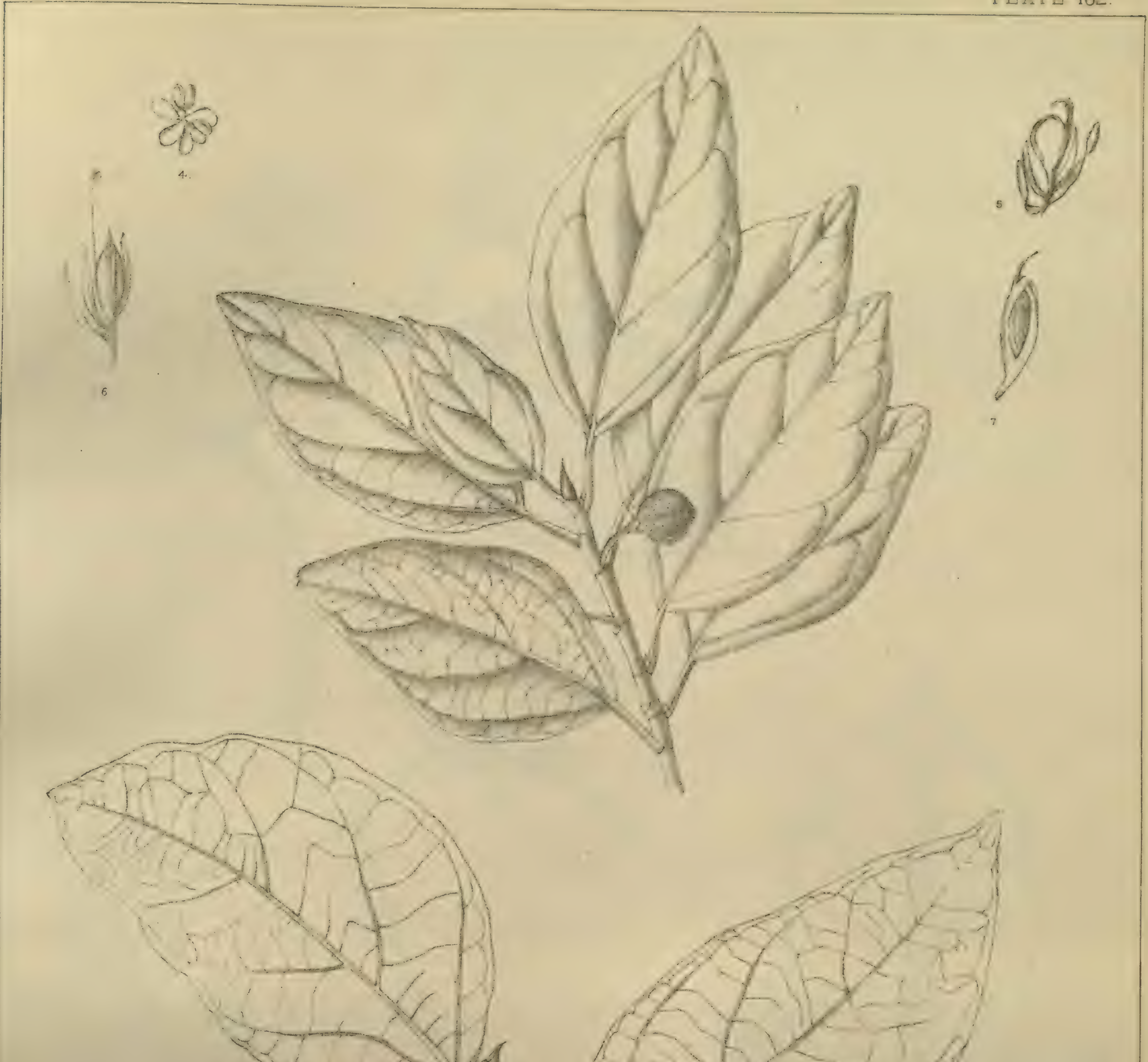
Lith. by B. K. Dutta.

FICUS DISTICHA, Blume.



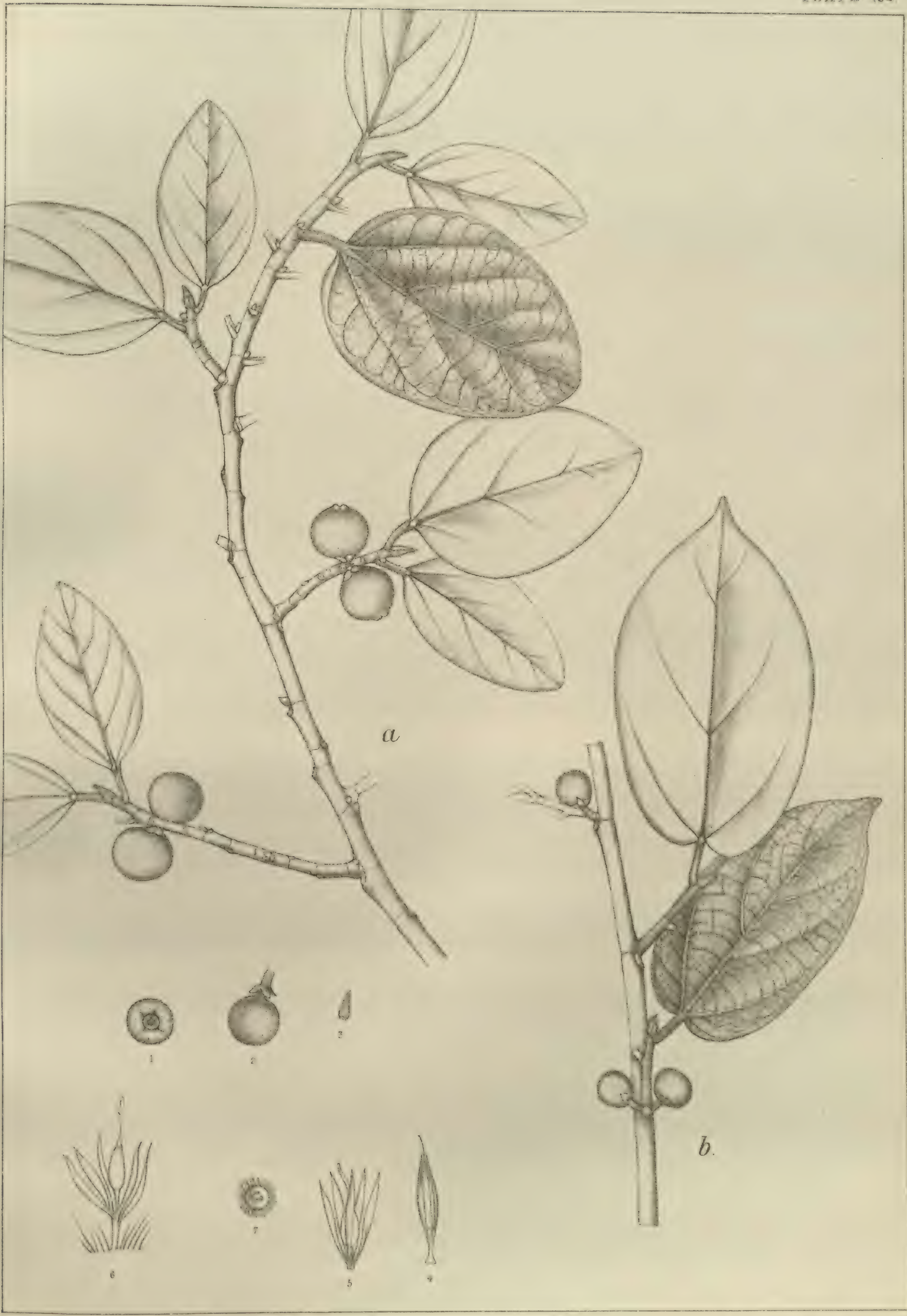
Lith. by B. K. Dutta

FICUS LAEVIS, Blume



Lith: by B. K. Dutta

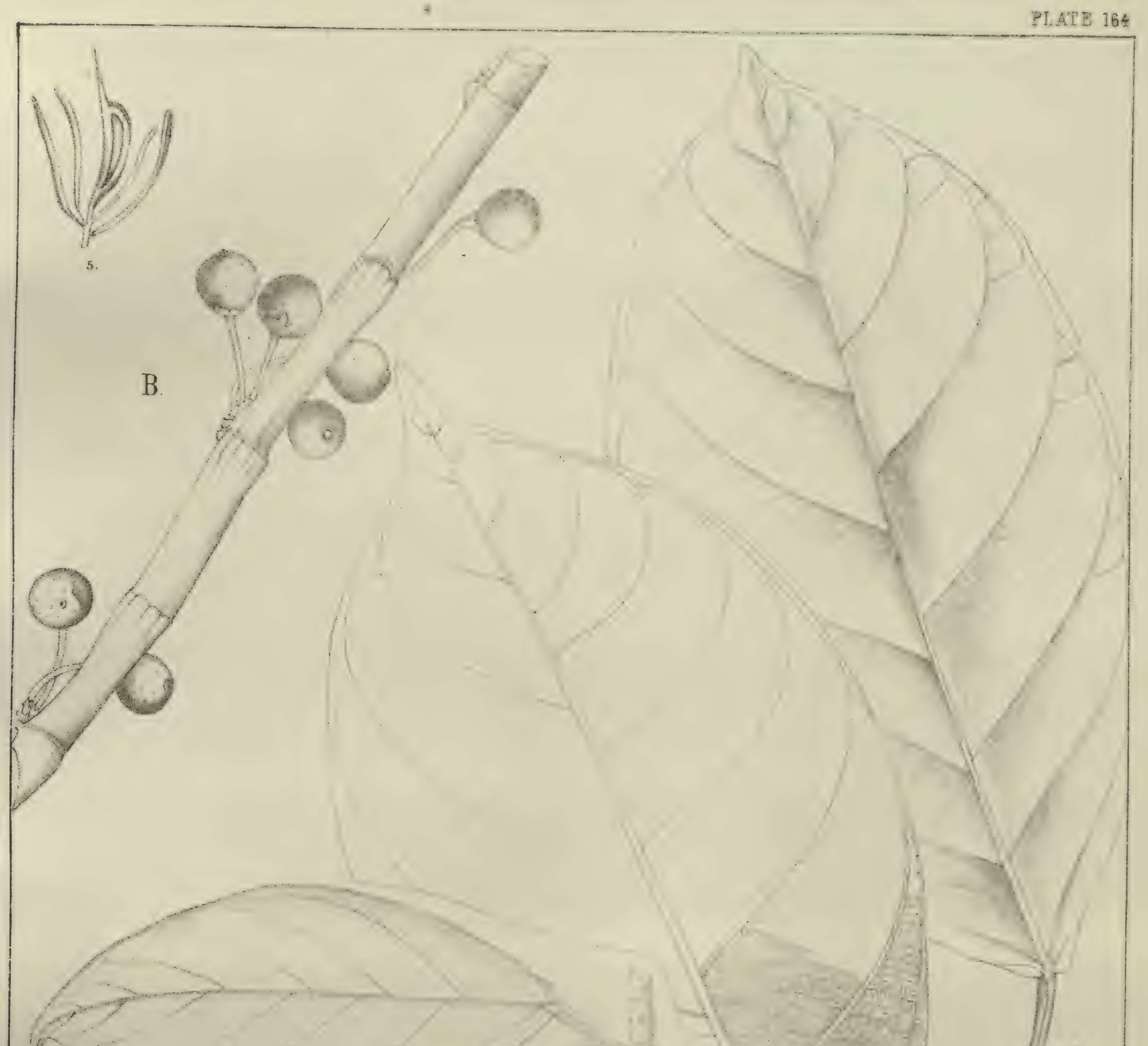
FICUS SCANDENS, Roxb.



Drawn by Gopal Chunder Das. Bot. Garden Calcutta

Lith and Printed by Kristohari Das.

FICUS OBTUSA, Hassk.



Drawn by Gopal Chunder Das, Bot. Garden Calcutta.

Lith. and Printed by Kristoharry Das.

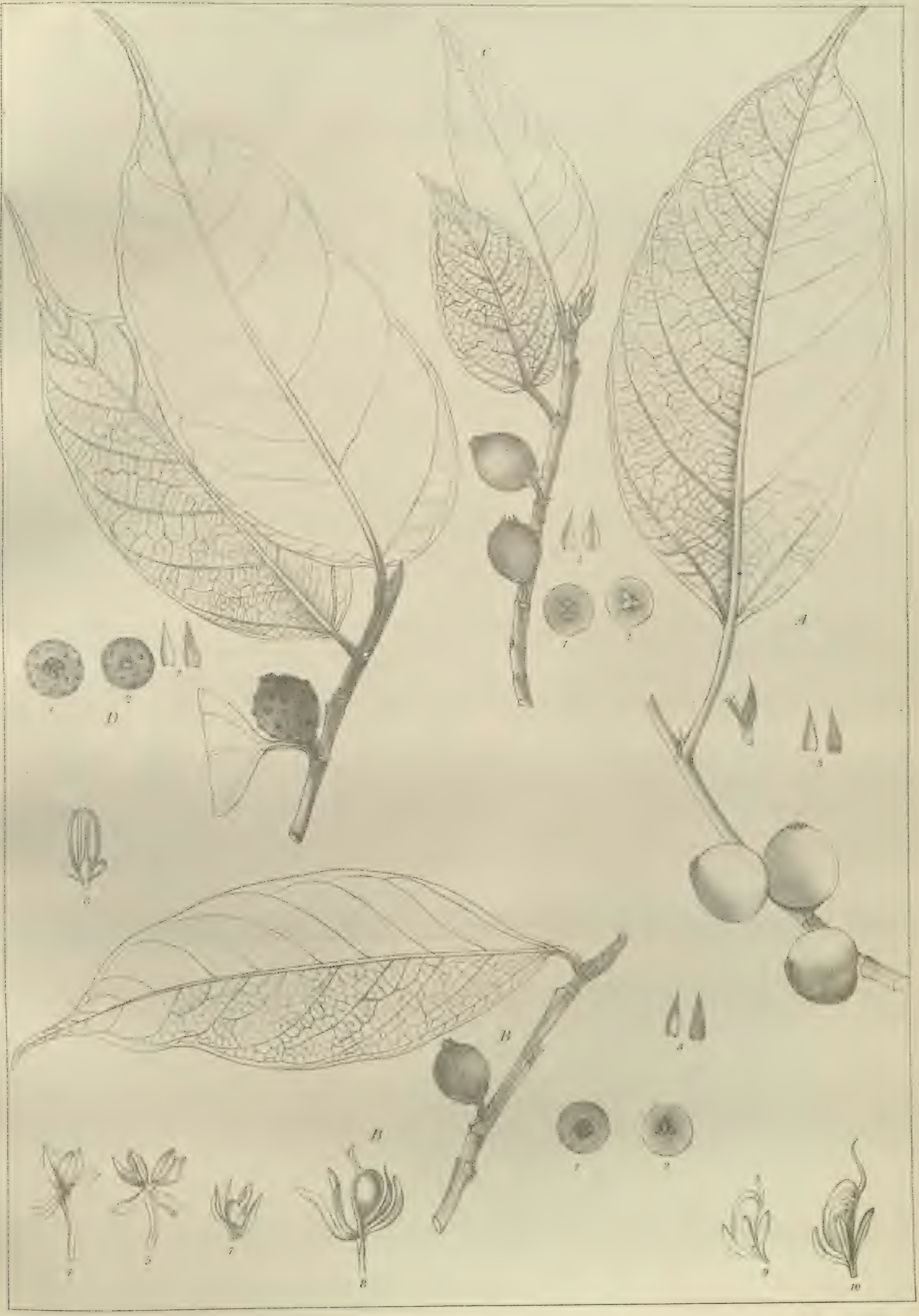
FICUS ALLUTACEA, Miq.

PLATE 165.

G. C. Das del. Bot. Garden Calcutta

Lith. by Hem Chunder Manna Govt. School of Art Calcutta.

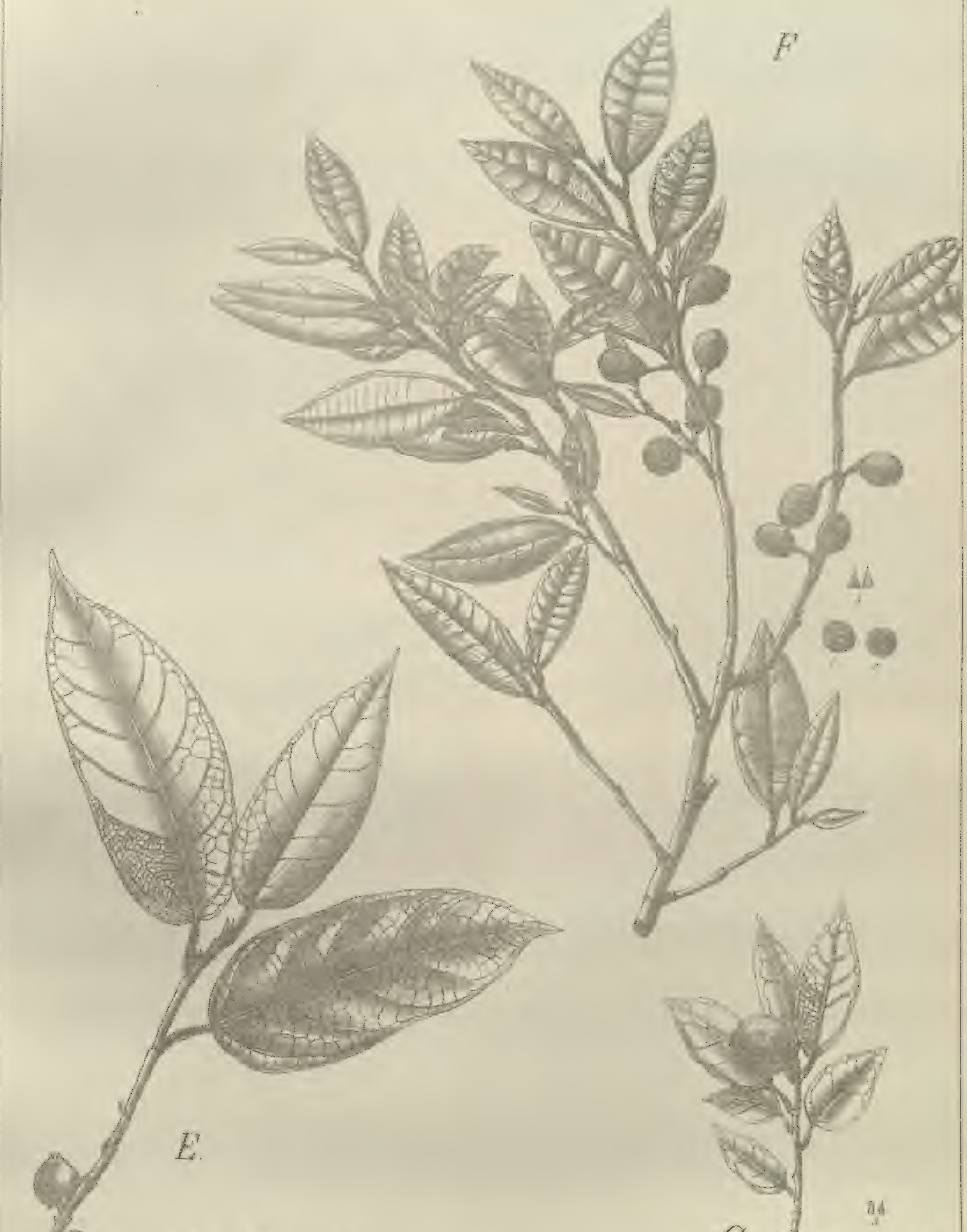
FICUS RECURVA, Blume.



G. C. Dass del. Bot. Garden Calcutta.

[illegible] Govt. School of Art, Calcutta.

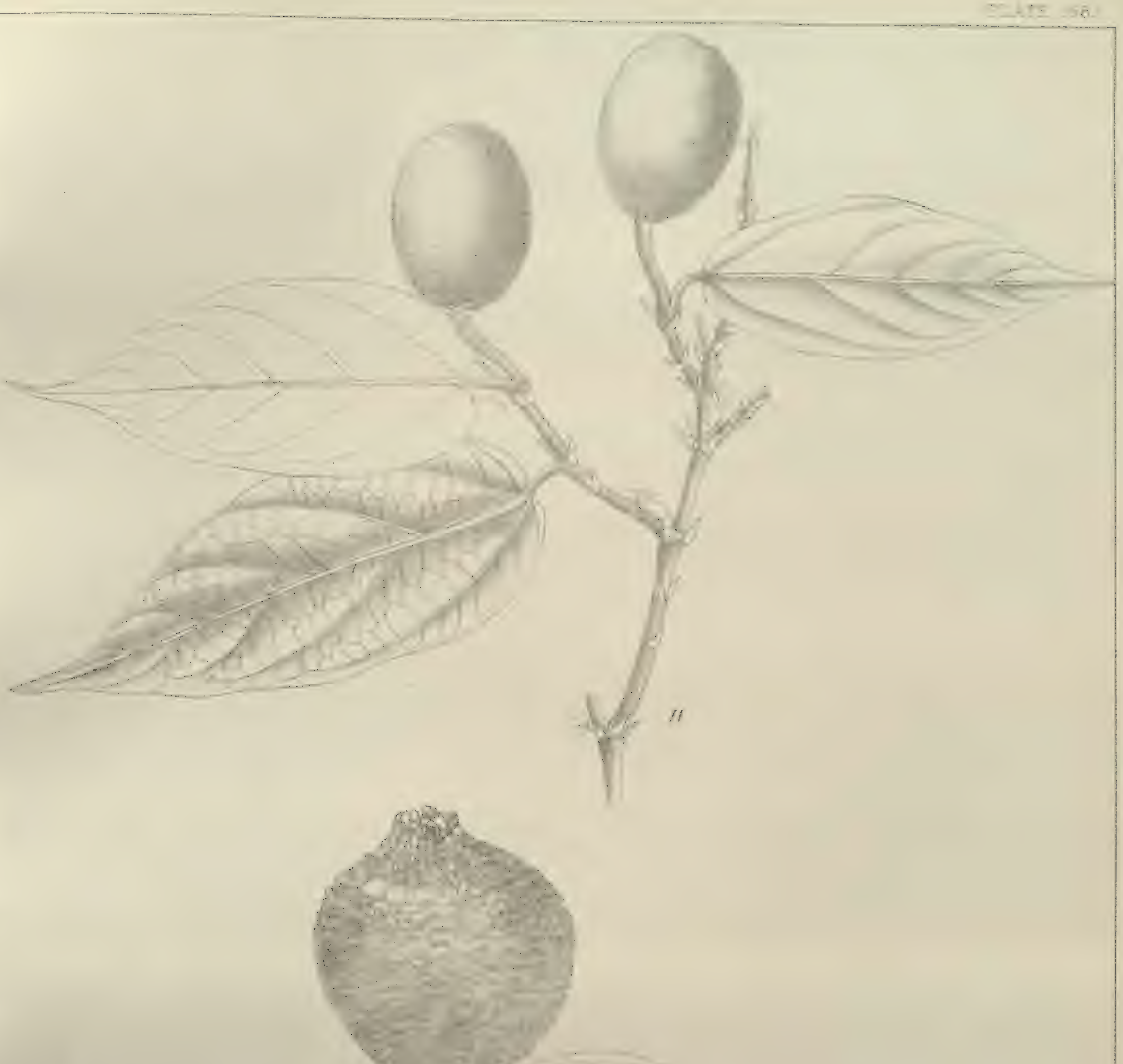
FICUS INVOLUCRATA Wall. (*Four forms*)

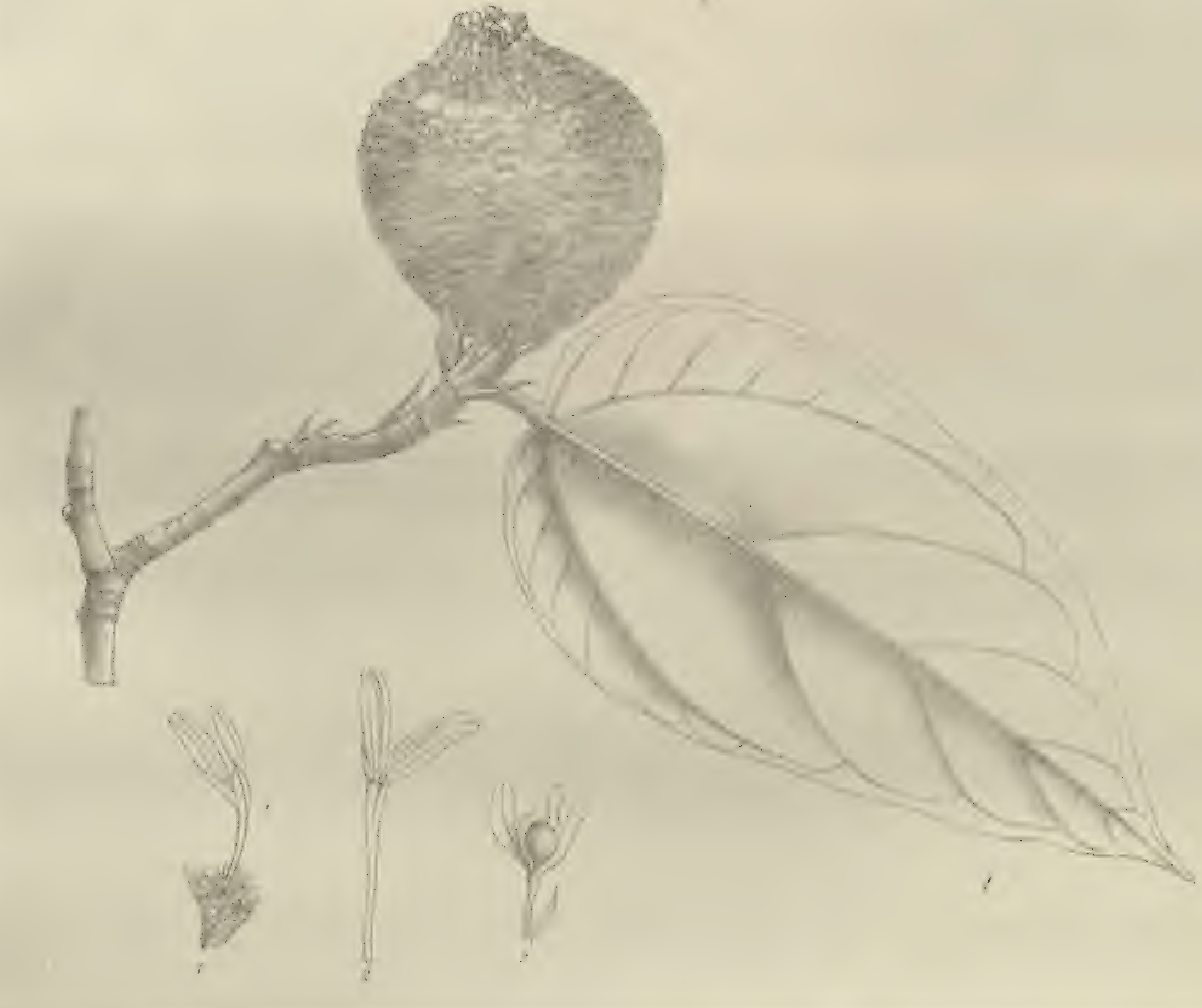


G C Das del. Bot. Garden Calcutta.

Lith: by C. L. Dàs Calcutta.

FICUS FOVEOLATA, Wall; *Three Varieties.*

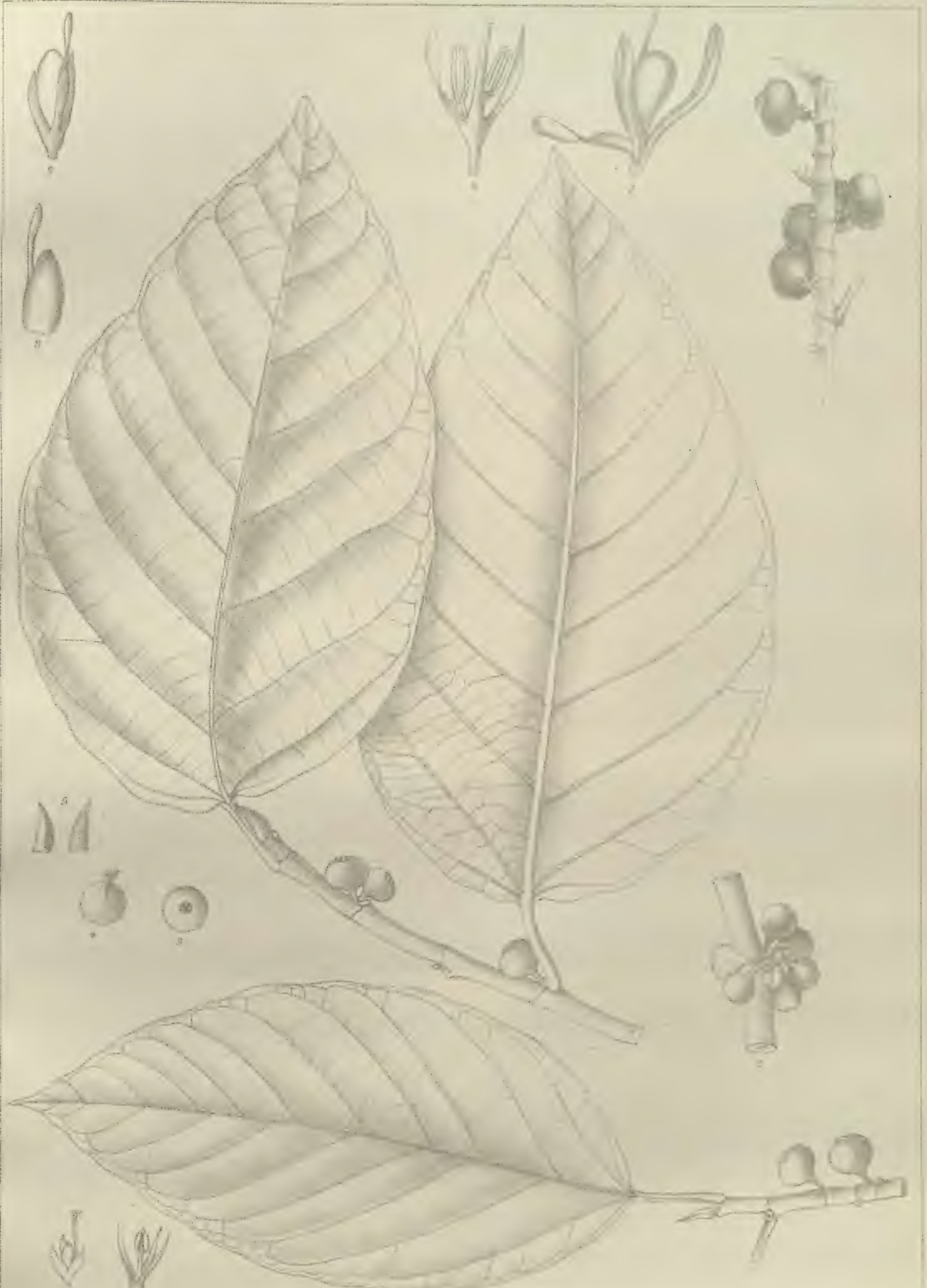




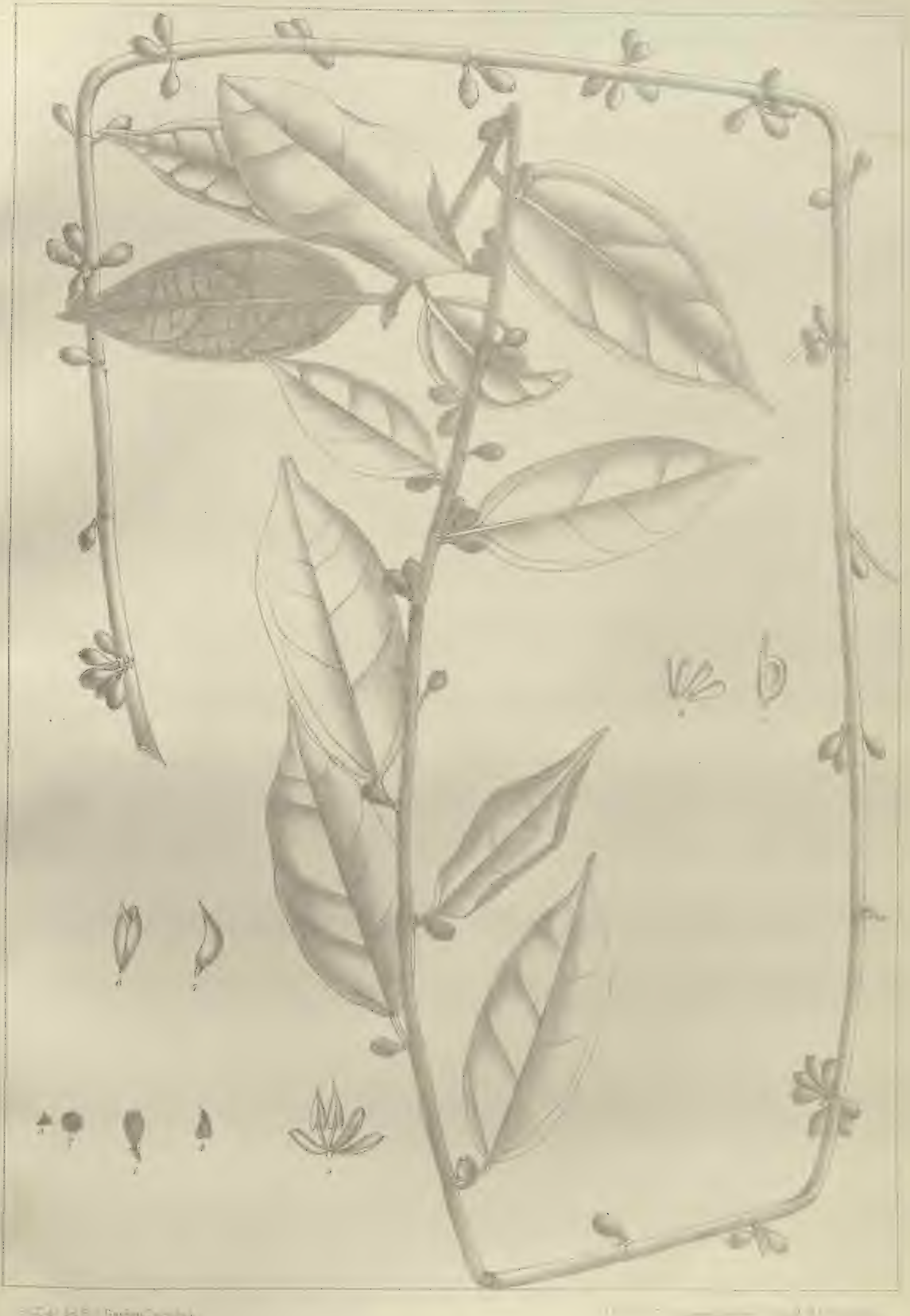
G. C. Das del. Bot. Garden Calcutta

[illegible] Govt. School of Art, Calcutta

FICUS FOVEOLATA, Wall. *H var: oleaeformis I var: [illegible]*



FICUS RAMENTACEA, Roxb.



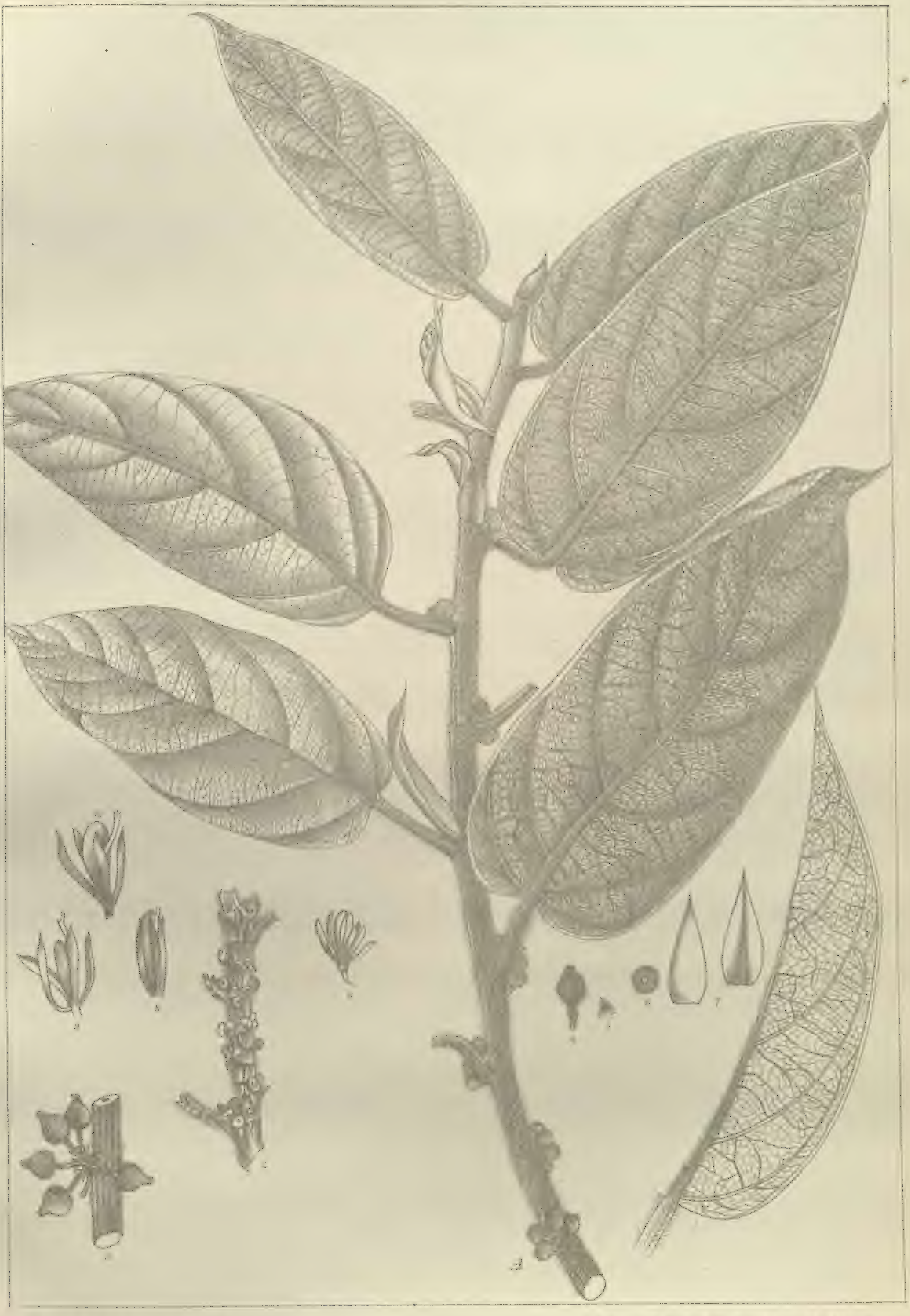
[illegible] [illegible]

FICUS [illegible], King

C. C. Das del. Bot. Garden Calcutta.

Lith. by J. C. Chuckerbutty Govt. School of Art Calcutta.

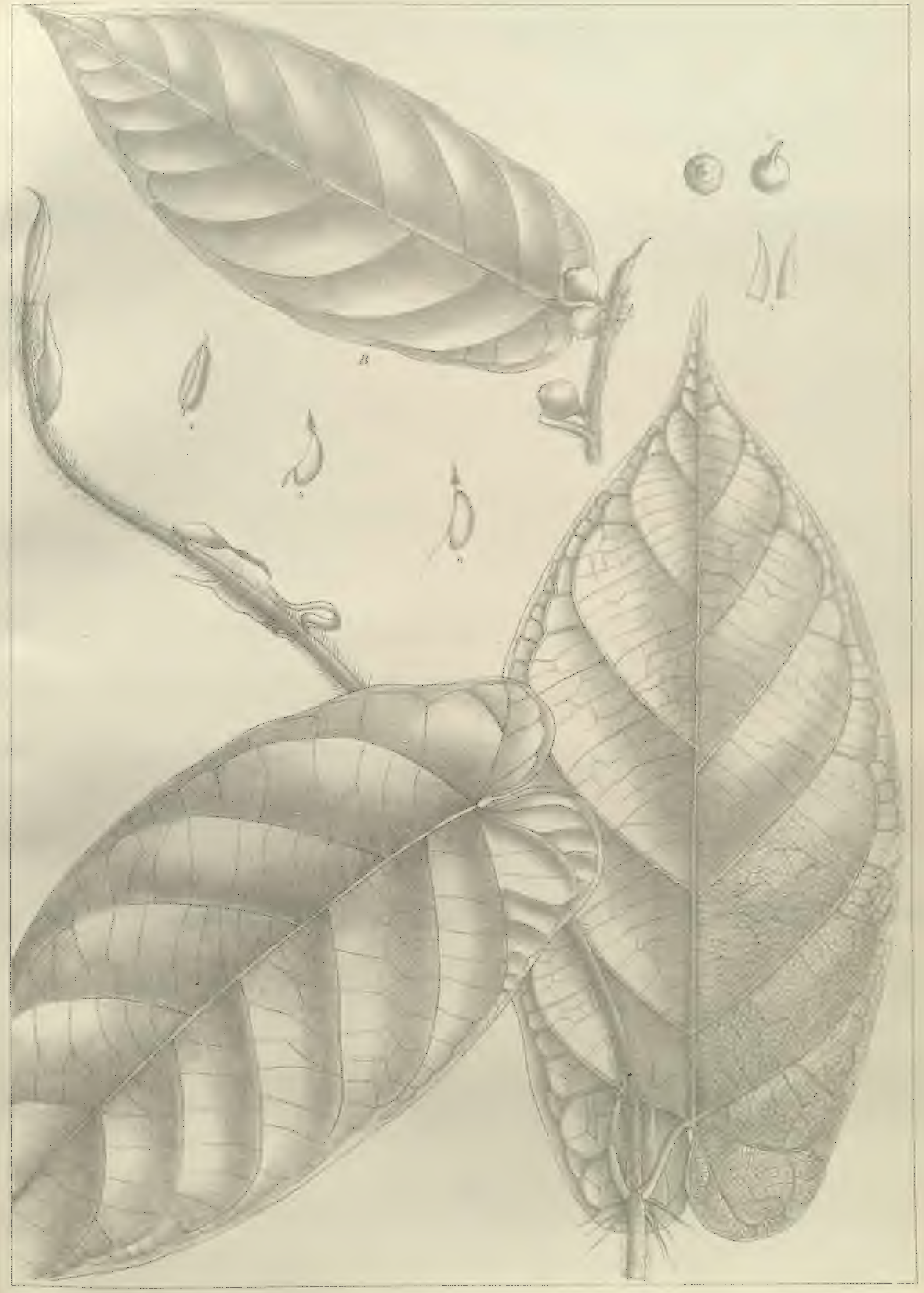
FICUS LANATA, Blume.



G. C. Das del. Bot. Garden Calcutta.

Lith. by J. C. Chuckerbutty Govt. School of Art Calcutta.

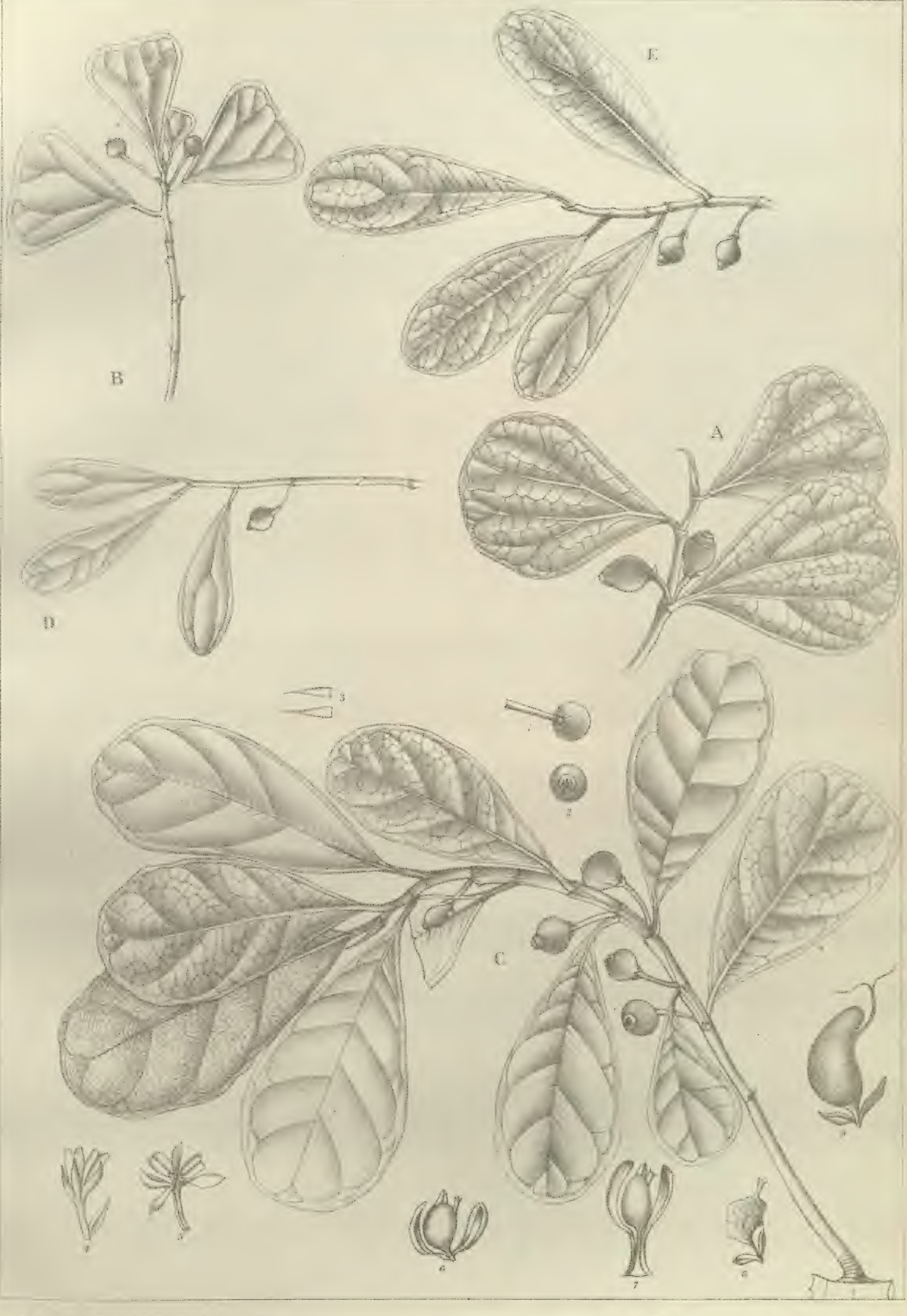
FICUS VILLOSA, Blume.



Aghore Lal Singh del. [illegible]

Lith by J. C. [illegible] School of Art Calcutta

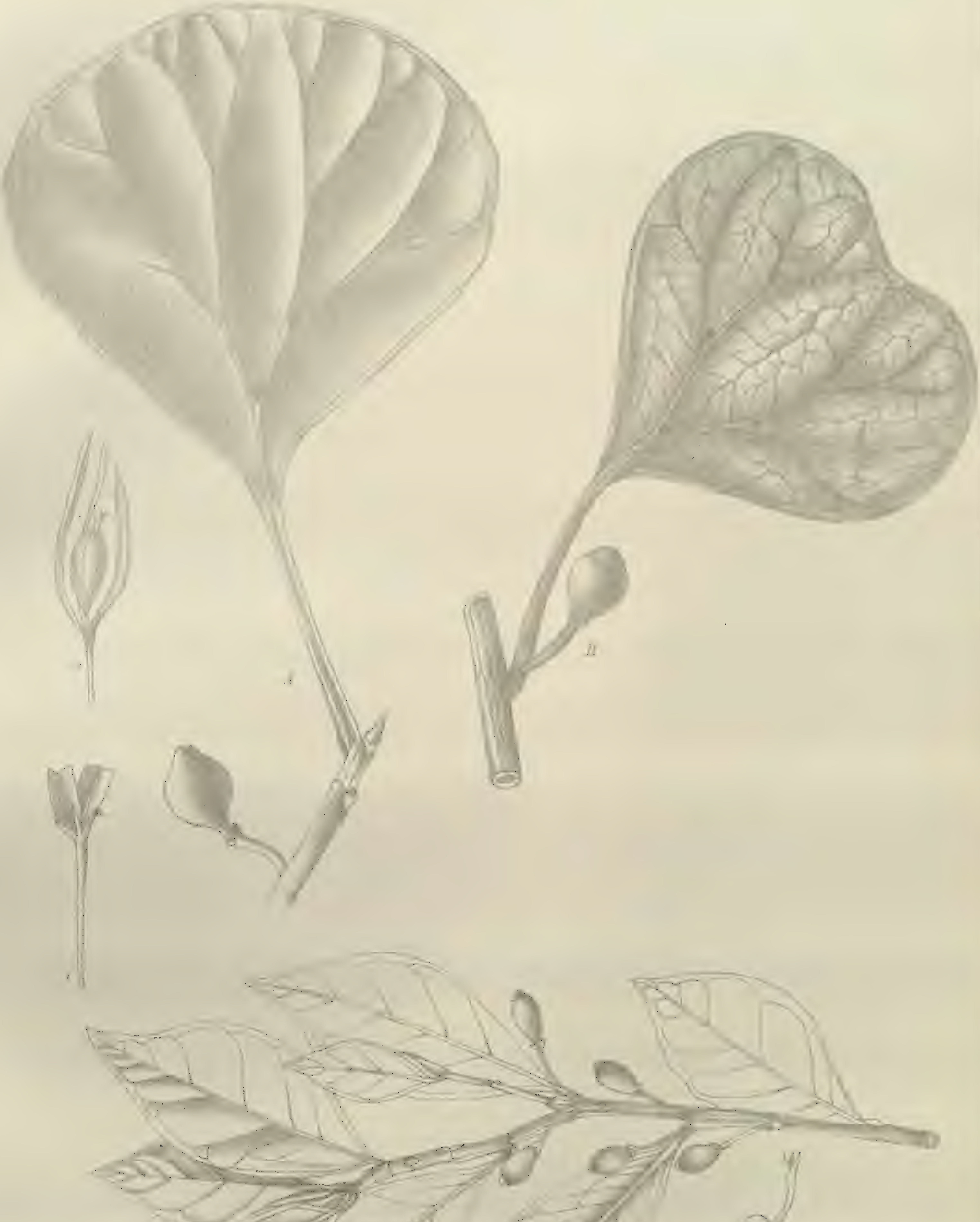
FICUS CRININERVIA, Miq.



Aghore lal Singh del. Bot. Garden Calcutta

Lith by J. C. Chuckerbutty Govt. School of Art Calcutta

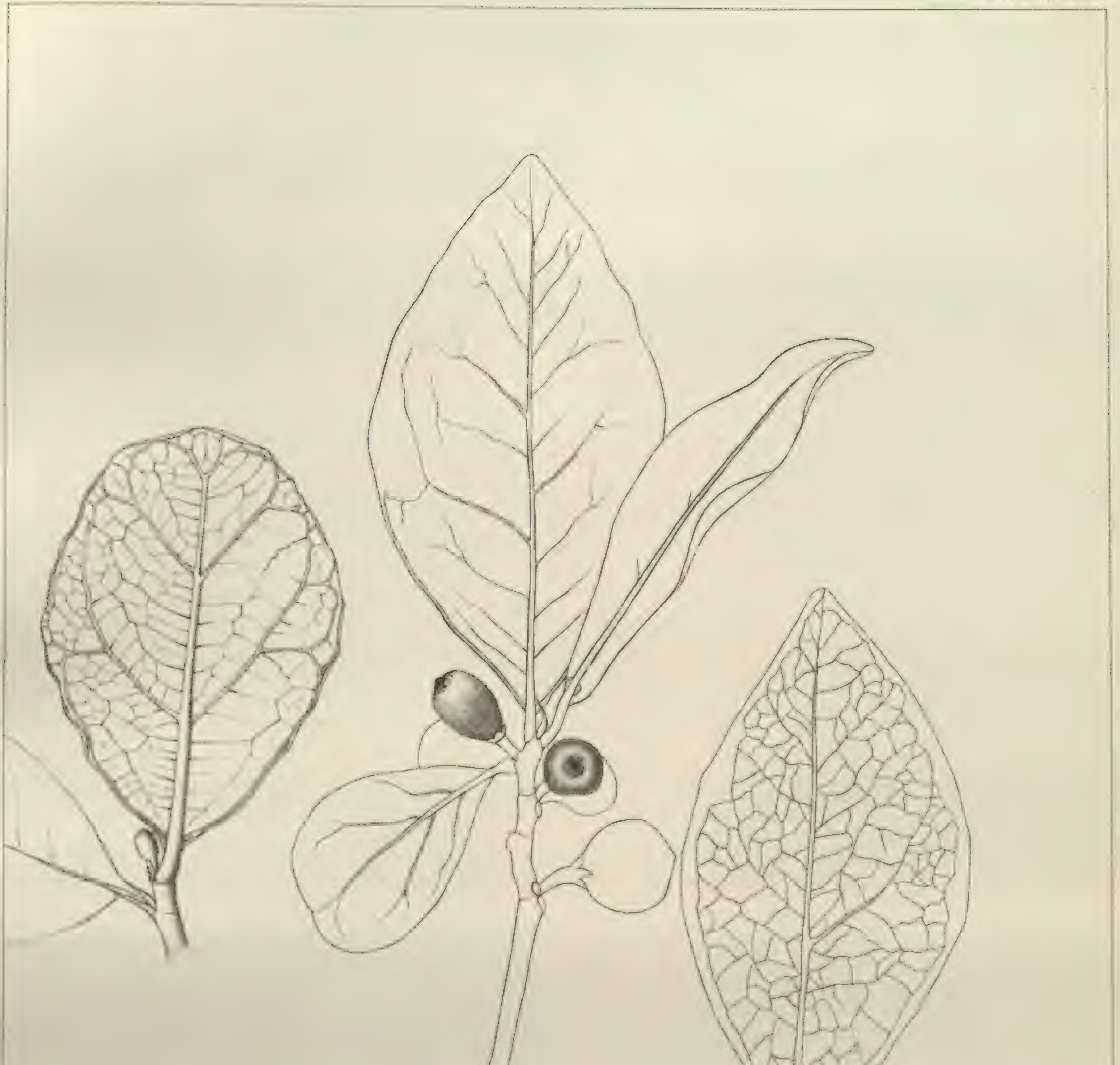
FICUS DIVERSIFOLIA, Blume.



[illegible] Garden Calcutta

[illegible] J. C. Chuckerbutty [illegible] Calcutta

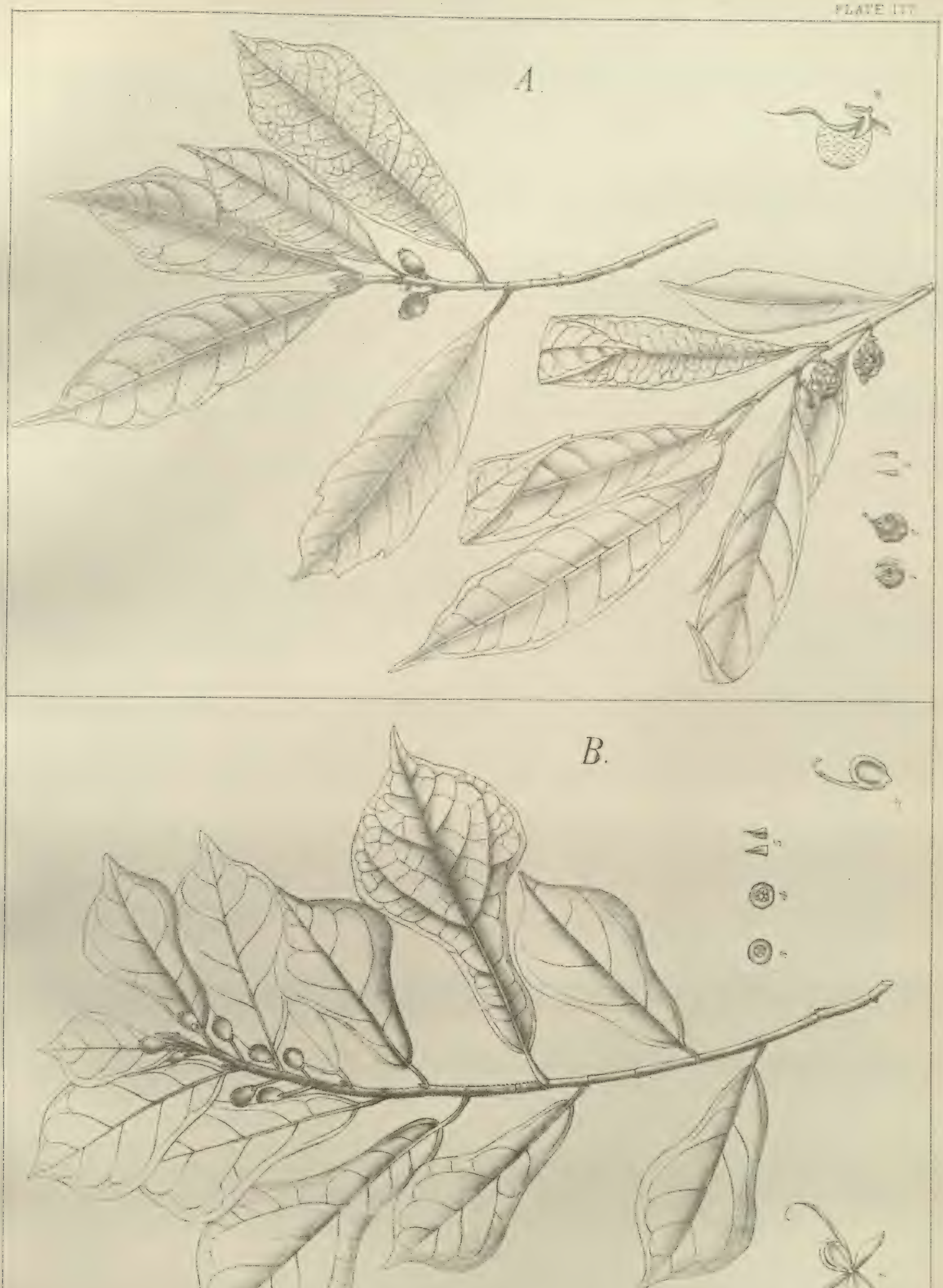
FICUS DIVERSIFOLIA, Blume.
A and B, Var. KUNSTLERI
C Var. LUTESCENS



[illegible] C. Das del. R.B. Garden Calcutta.

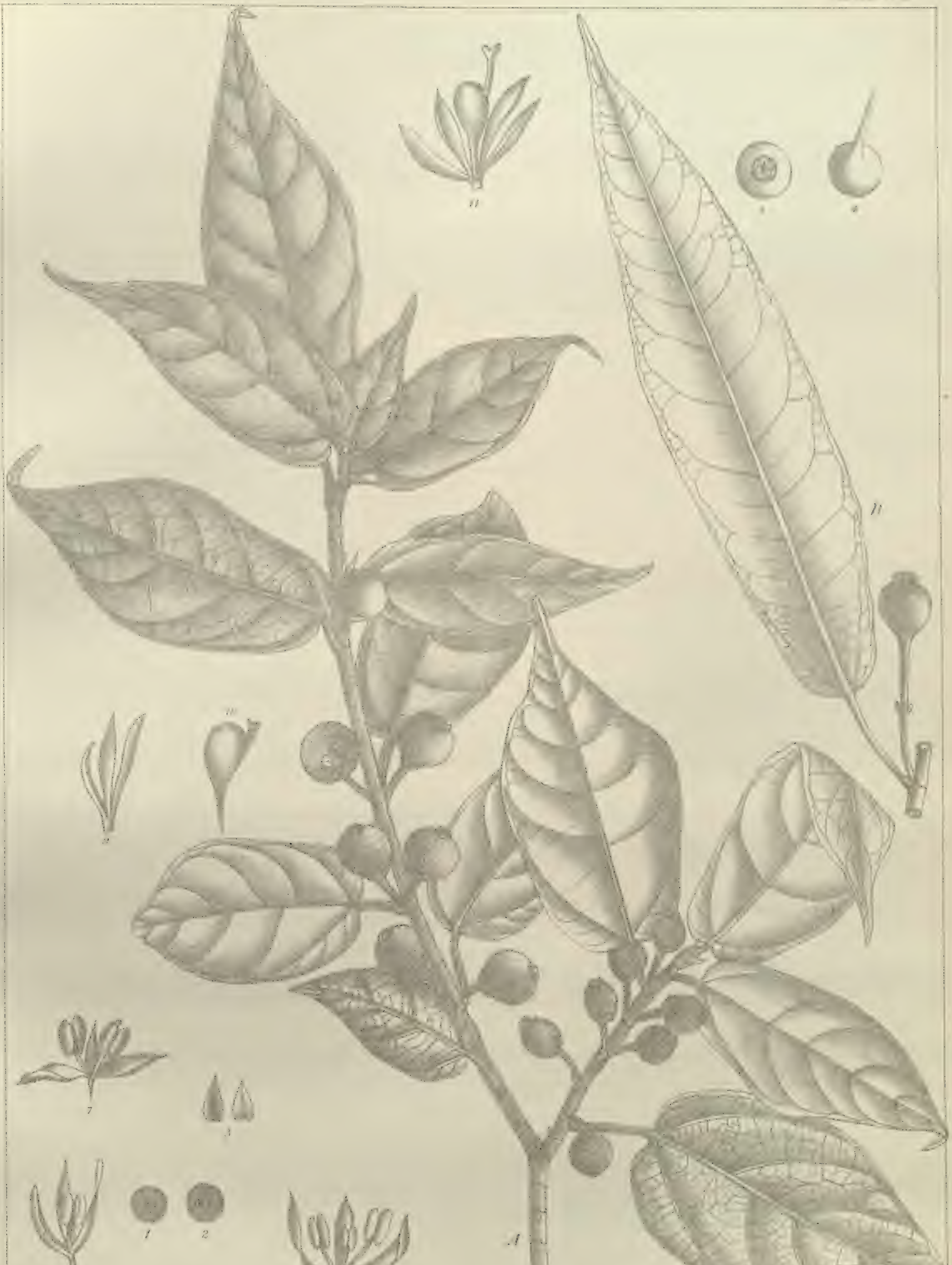
Lith. by H. L. Pal Govt. School of Art Calcutta.

FICUS OLIGONEURA, Miq.



A. L. Singh del. Bot Garden Calcutta.
Lith. by C. L. Dās Calcutta

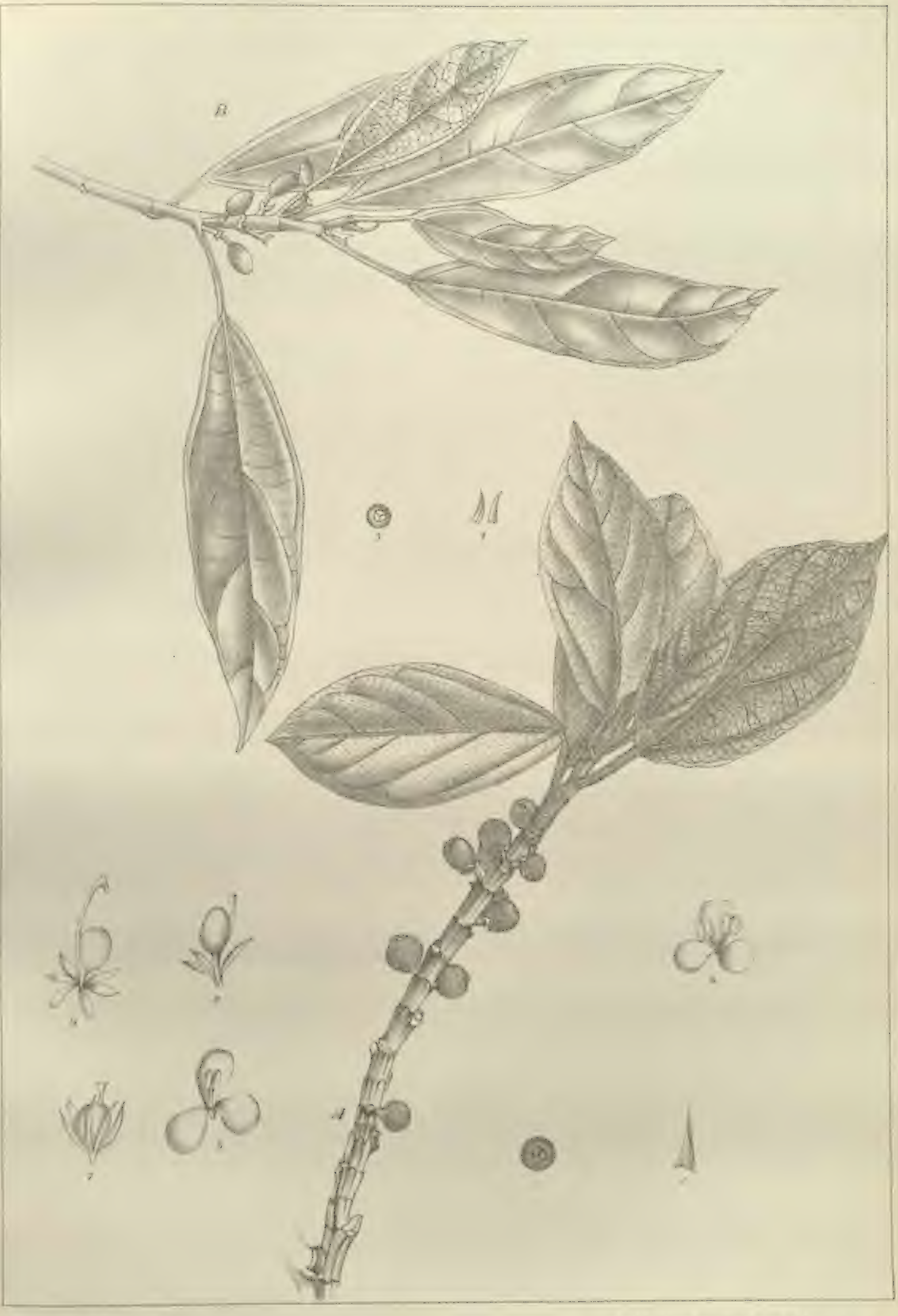
A. FICUS FORMOSANA, Maxim.
B. —— PANDURATA, Hance.



[illegible] Calcutta

Lith. by [illegible] School of Art Calcutta.

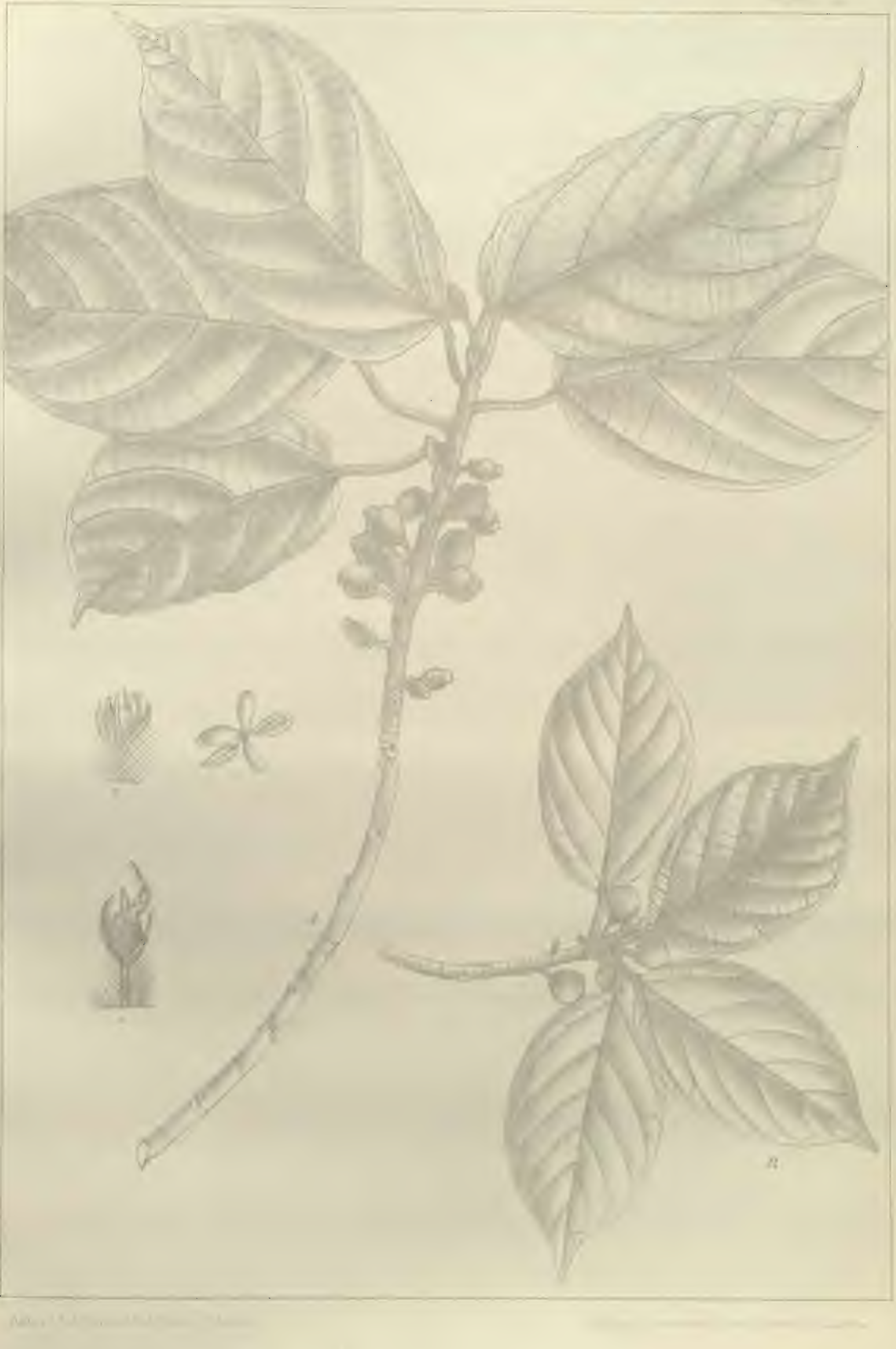
FICUS ERECTA, Thunb.; *A var Beecheyana; B var Sieboldi.*

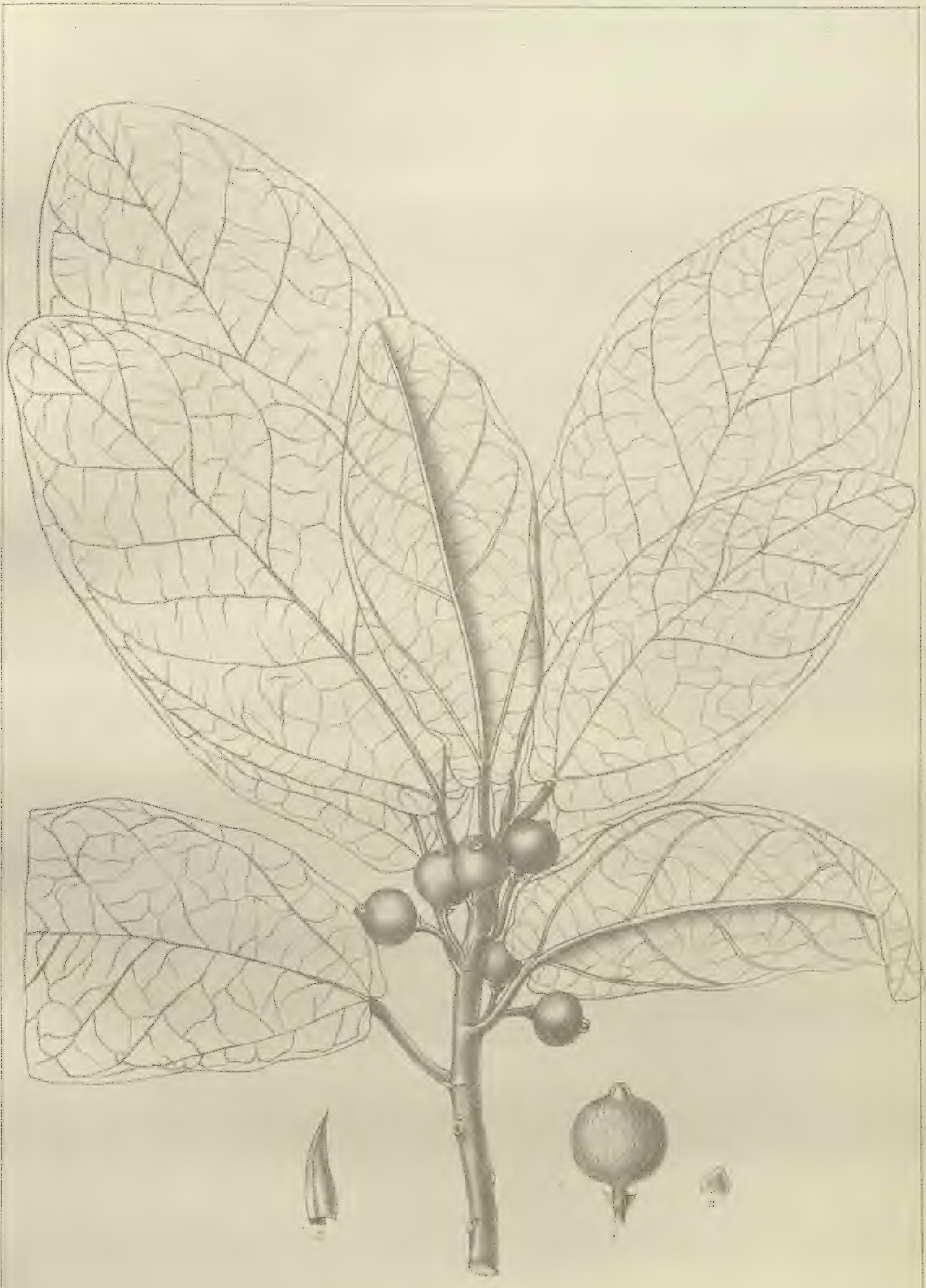


C. D. Das del. Bot. Garden Calcutta

Lith. by J. C. Chuckerbutty Govt. School of Art Calcutta

A. FICUS TRICOLOR, Miq. B *var. [illegible]*



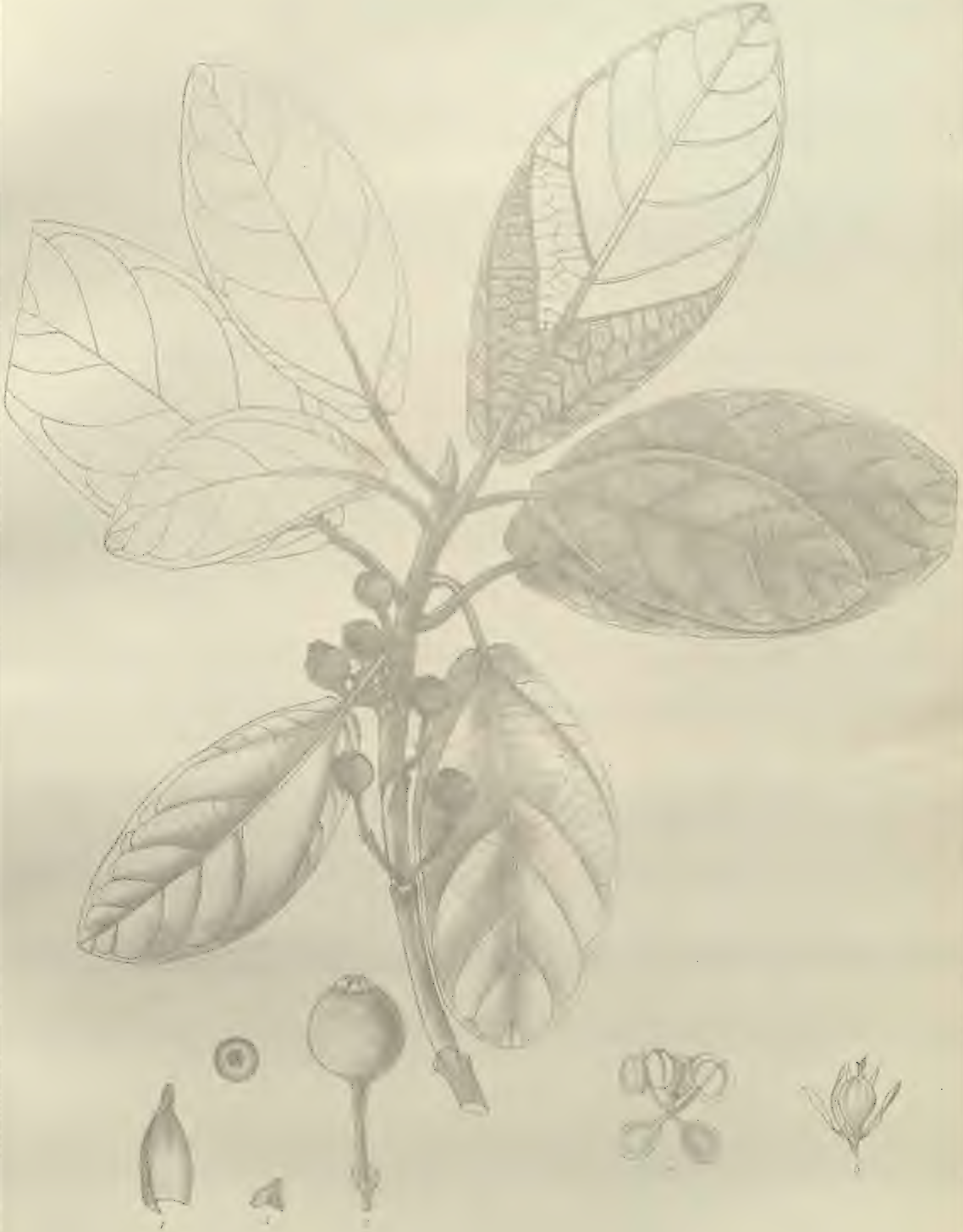


M. Smith del.

Lith by J. C. [illegible] Govt. School of Art, Calcutta.

FICUS MOSELEYANA, King.

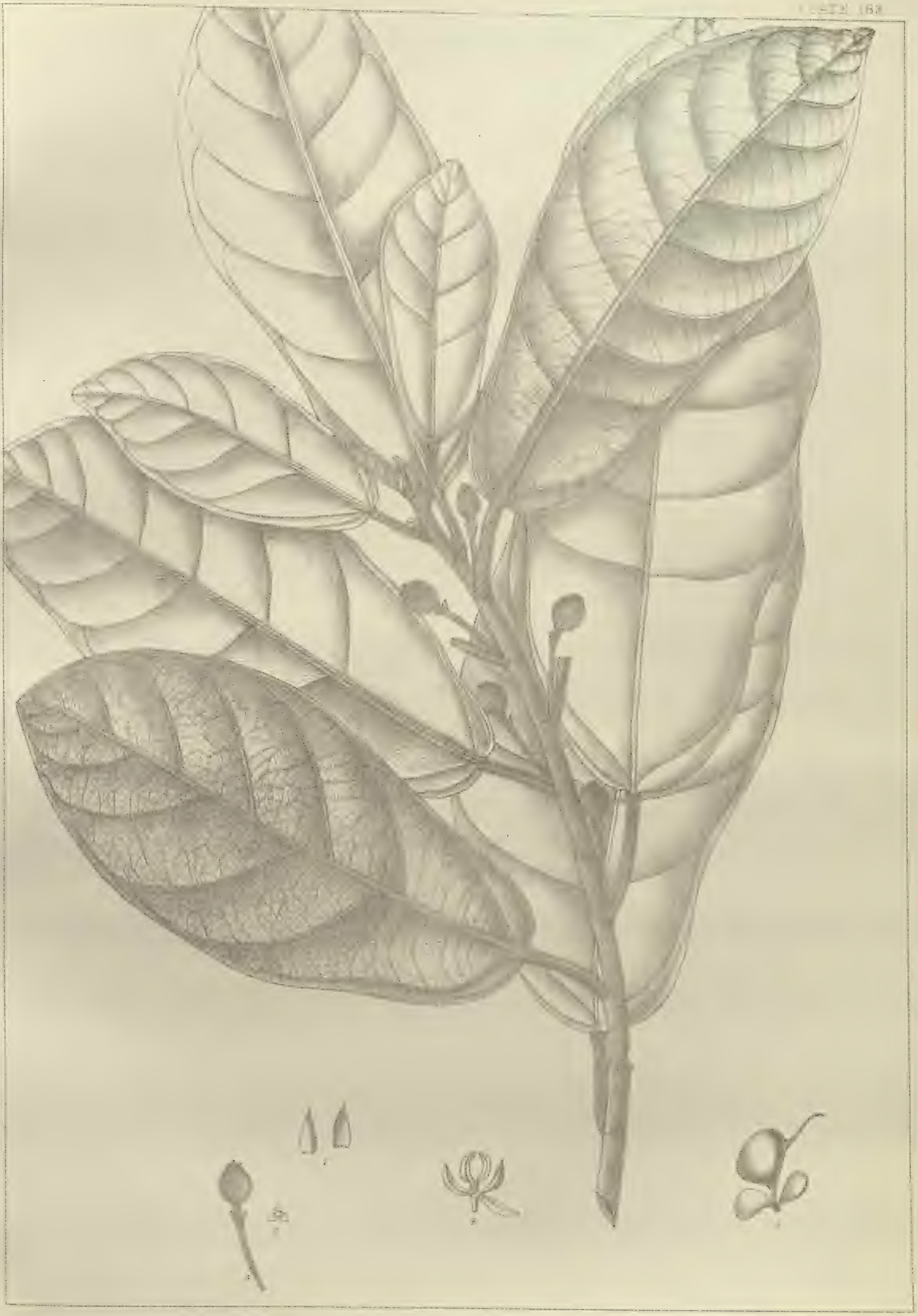
PLATE 182.



G.C. Das del. Bot. Garden Calcutta.

Lith. by J. L. [illegible] Govt. School of Art Calcutta.

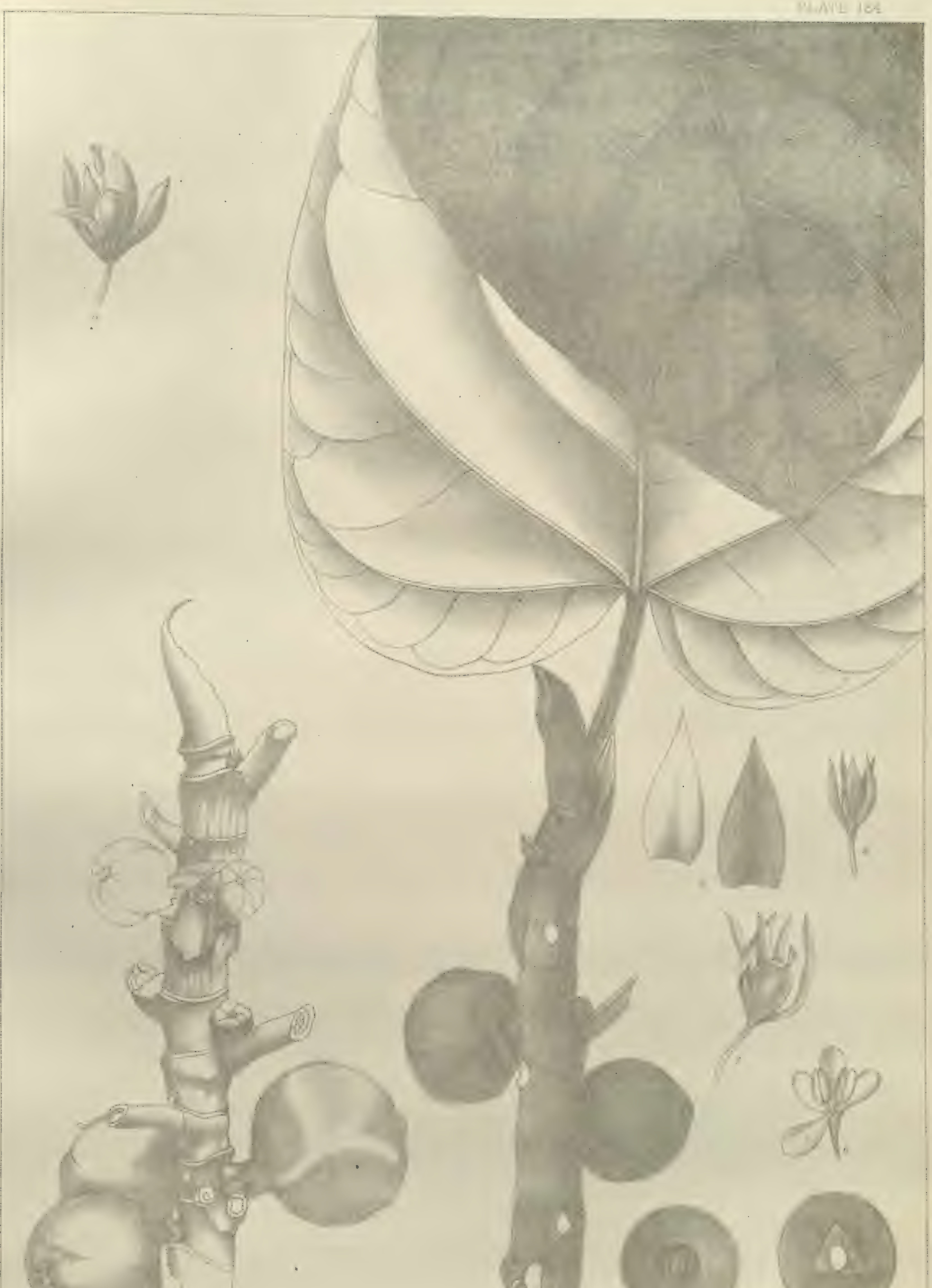
FICUS MACROPODA, Miq.



A. S. Das del. Bot. Garden, Calcutta

Lith. by [illegible] School of Art Calcutta

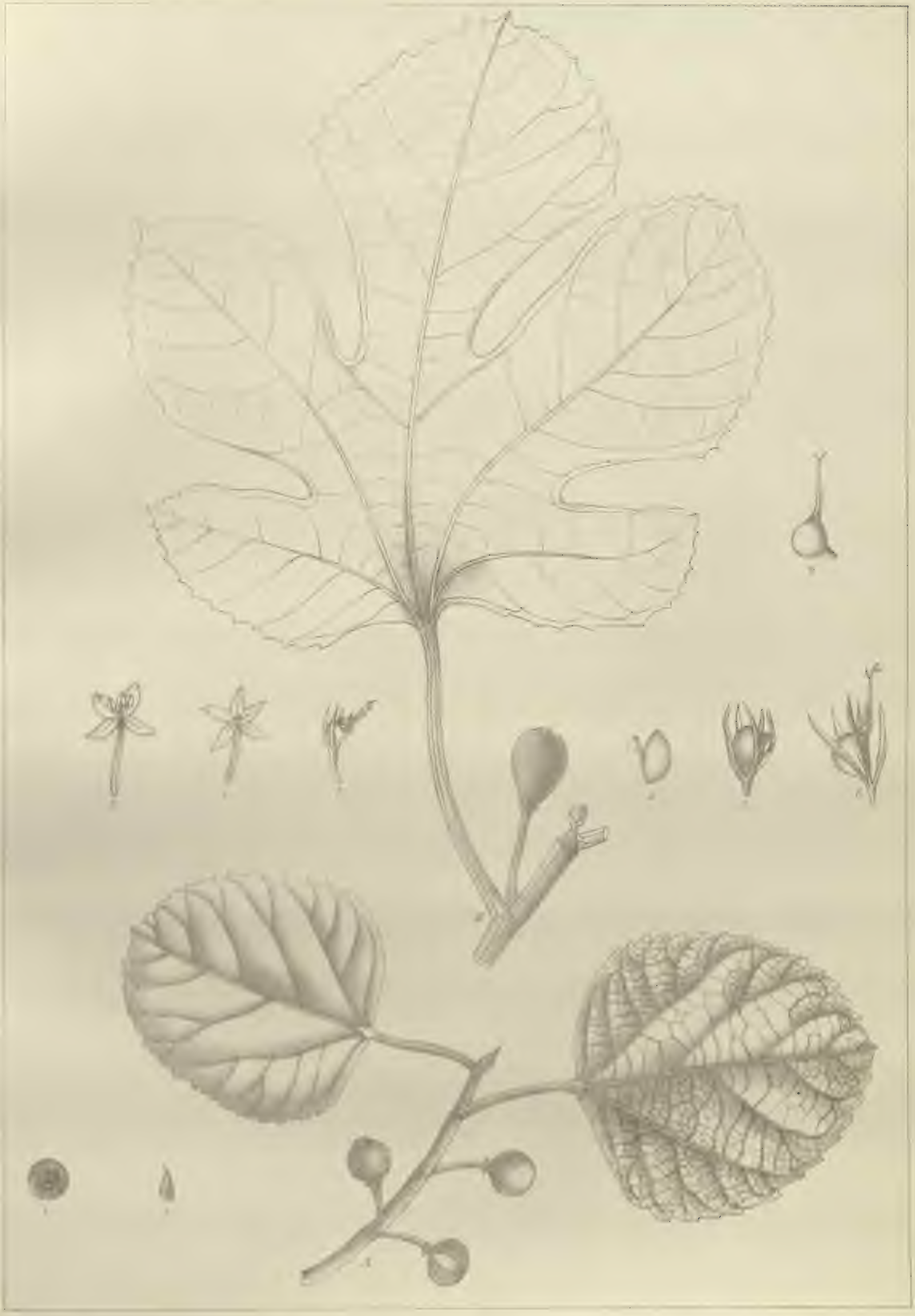
FICUS PEDUNCULOSA, Miq.



K. P. Das del. Roy. Botanic Garden Calcutta.

[illegible] Government School of Art Calcutta

FICUS TOXICARIA, Linn.

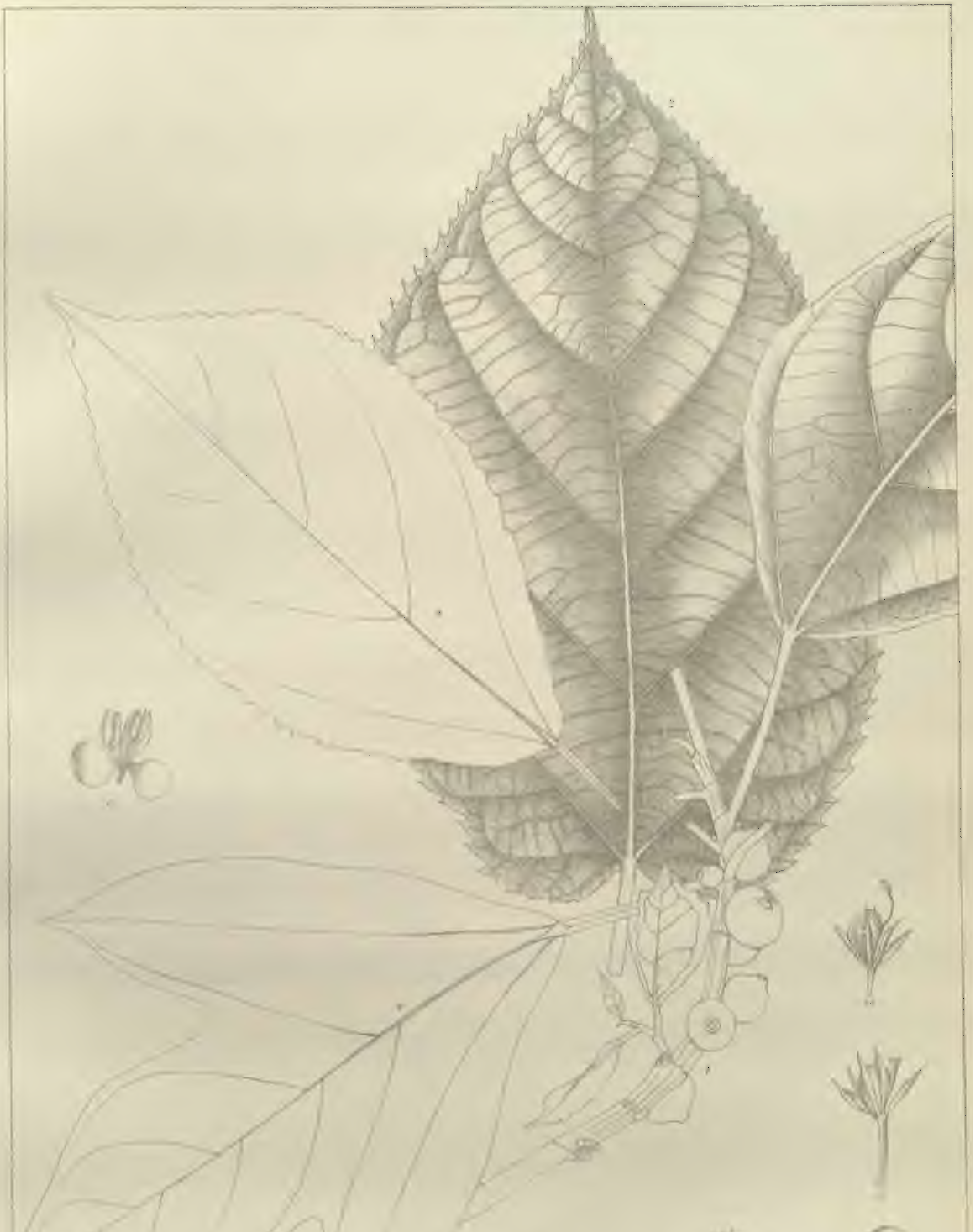


[illegible]

[illegible]

FICUS PALMATA, Forsk.

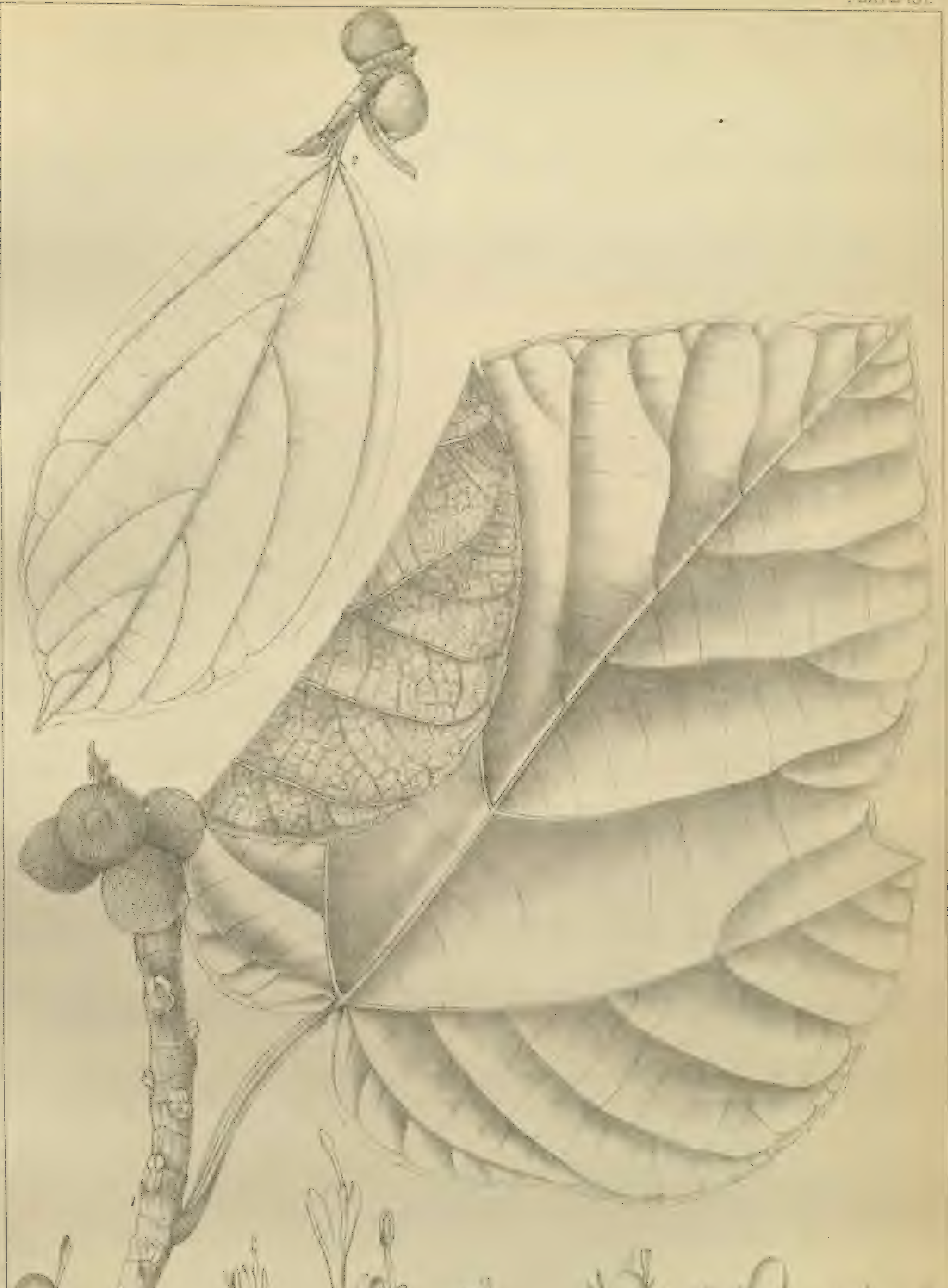
PLATE [illegible]



[illegible]

[illegible]

PLATE 187.

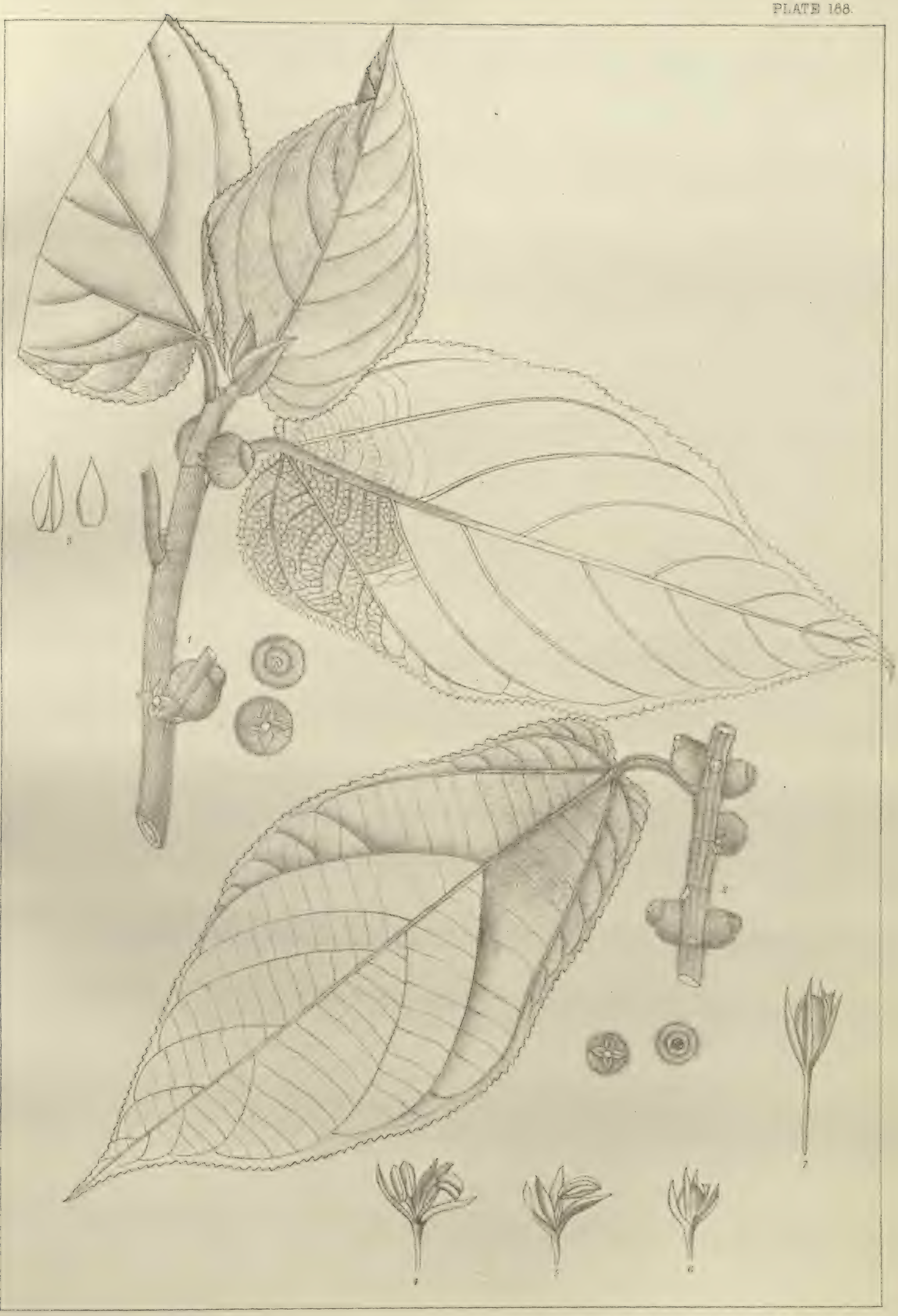


G. C. Das del. Bot. Garden Calcutta.

Lith. by J. C. Chuckerbutty Govt. School of Art, Calcutta.

FICUS FULVA, Reinw.

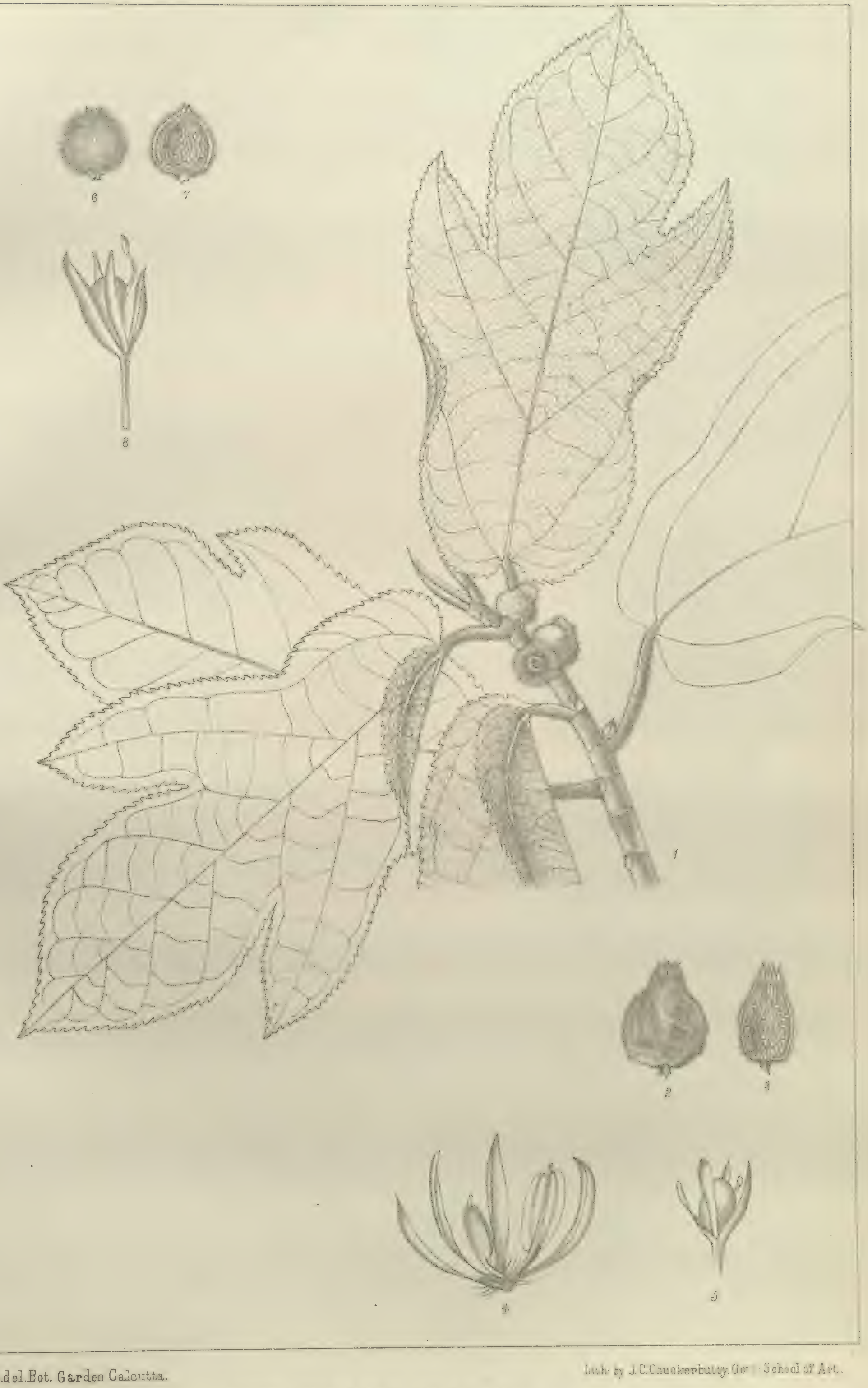
PLATE 188.



G. C. Das del. Bot. Garden Calcutta.

Lith. by J. C. Chuckerbutty, Govt. School of Art, Calcutta.

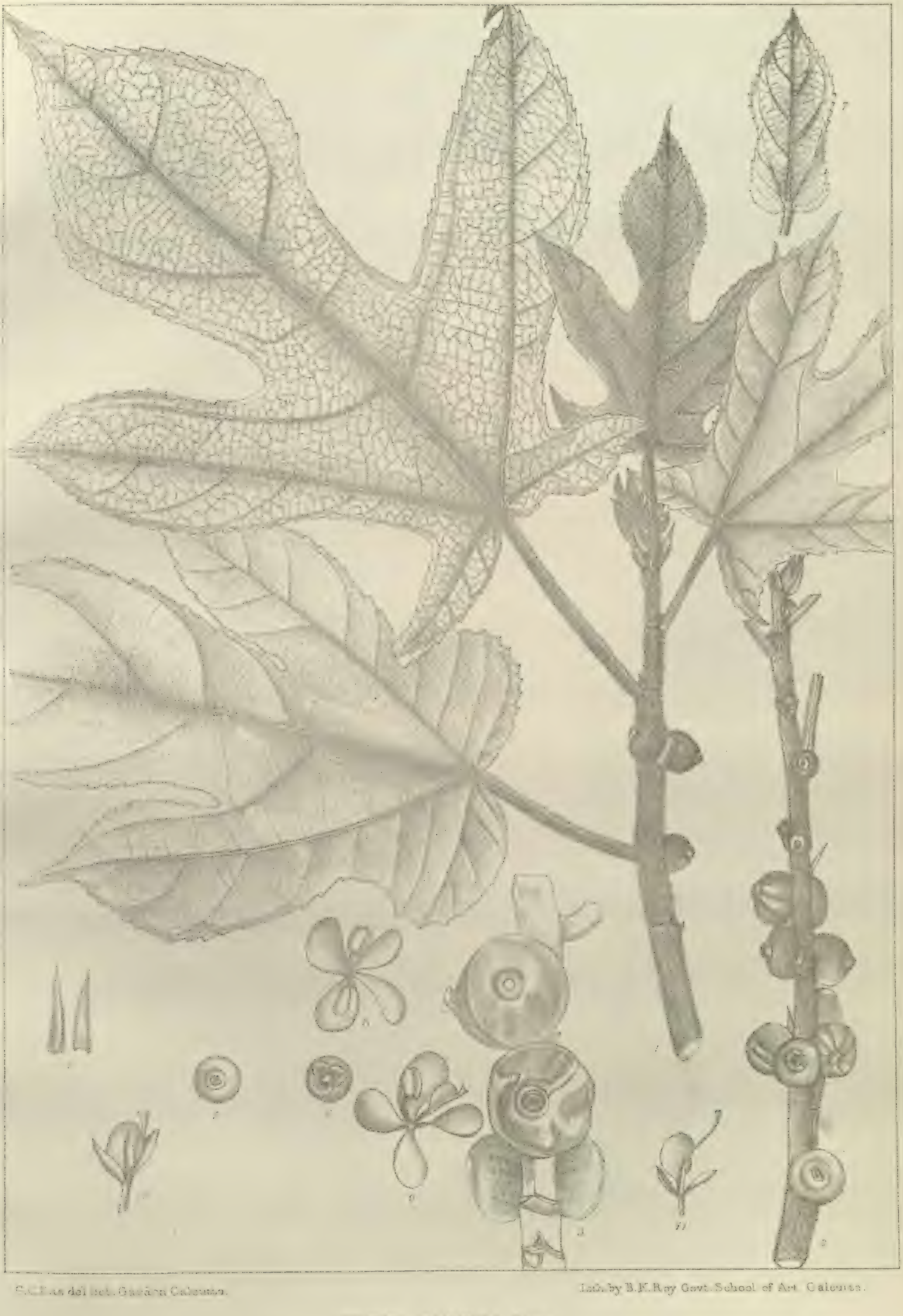
FICUS HIRTA, Vahl.



G.C.Das.del.Bot. Garden Calcutta.

Lith. by J.C.Chuckerbutty. Govt: School of Art.

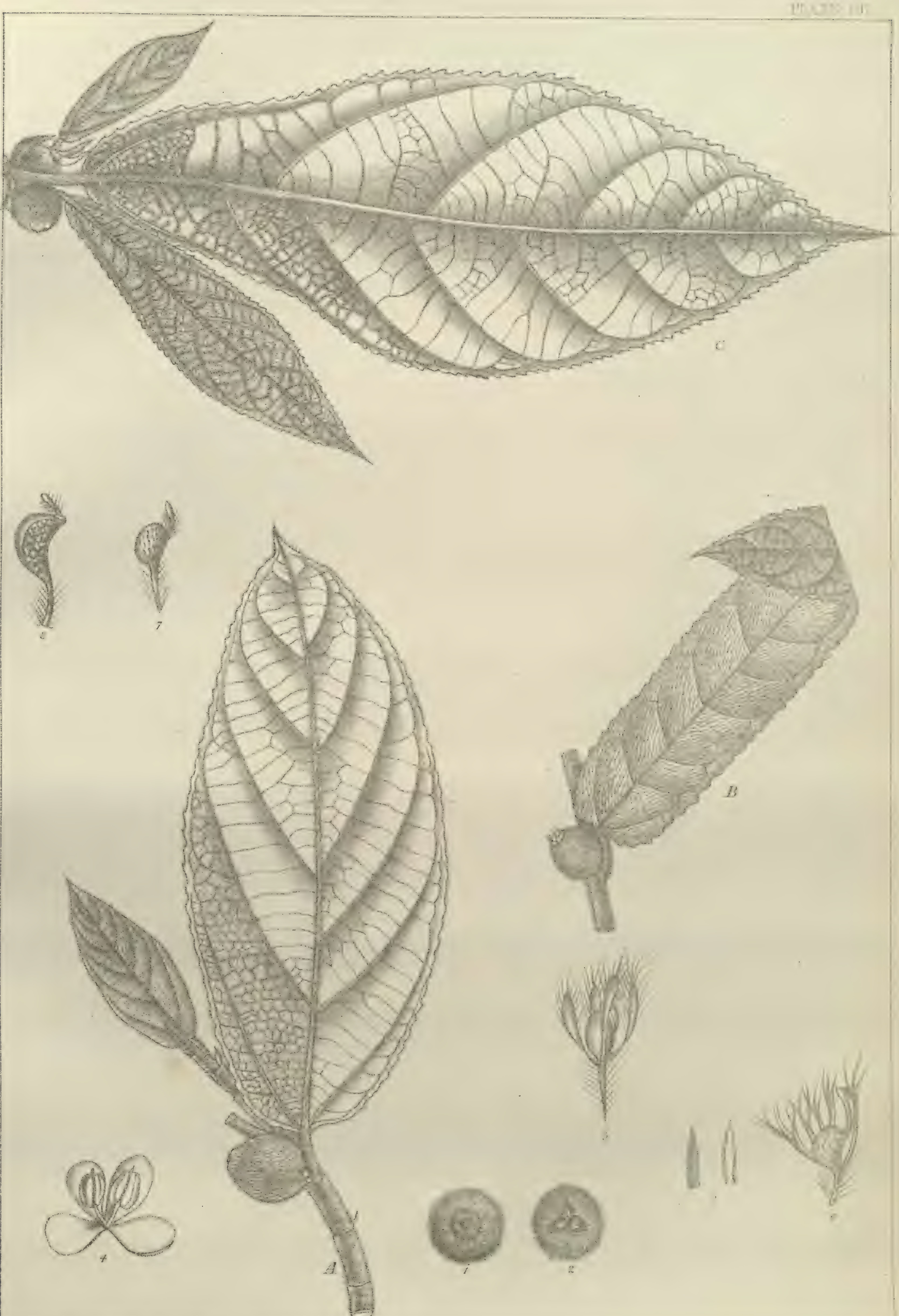
FICUS HIRTA, VAHL; Var Roxburghii



G.C. Das del. Bot. Garden Calcutta.

Lith. by B.K. Roy Govt. School of Art. Calcutta.

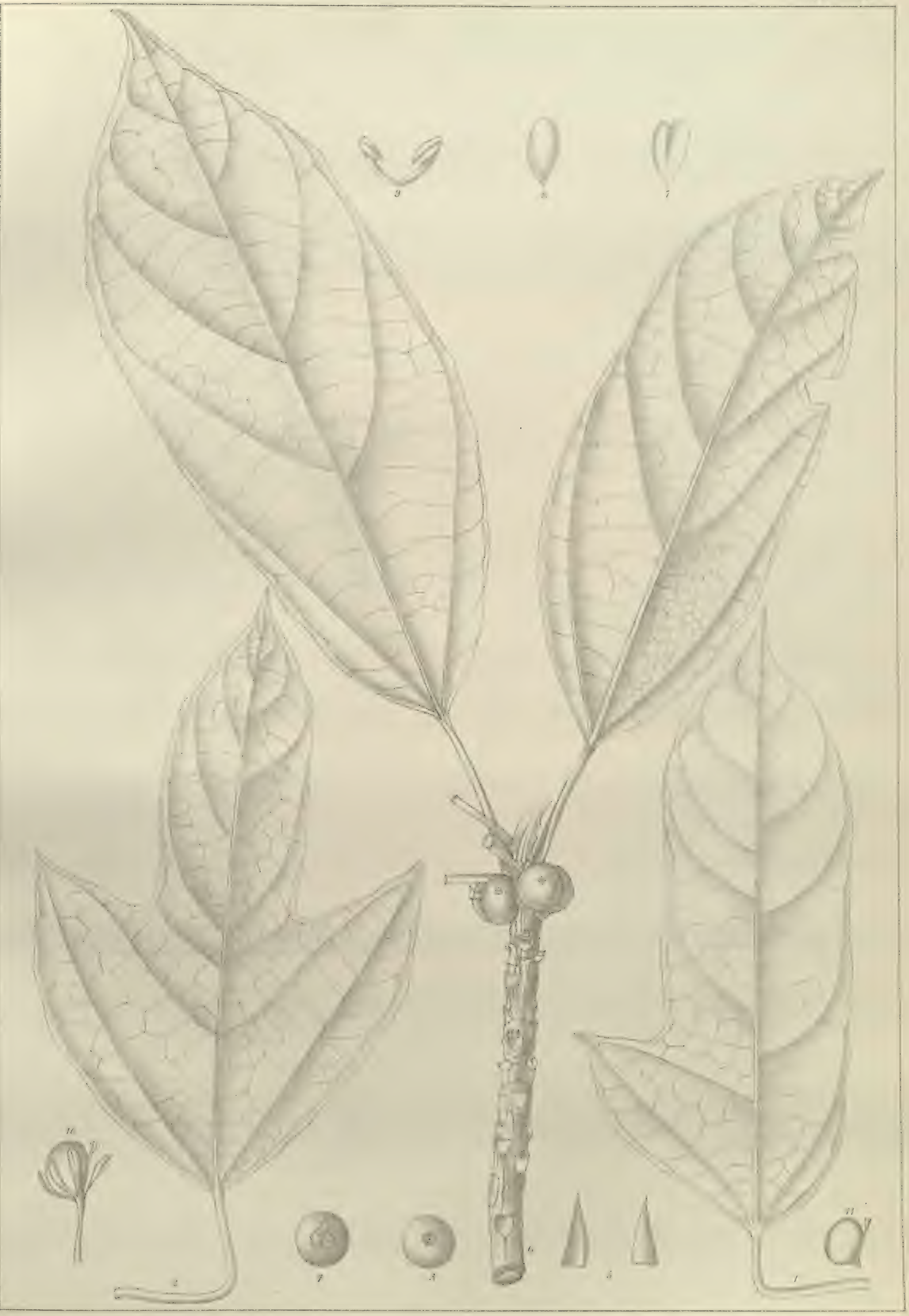
FICUS DUMOSA, King.



Aghore Lal Singh del. Bot. Garden Calcutta.

Lith. by J. C. Chuckerbutty Govt. School of Art Calcutta.

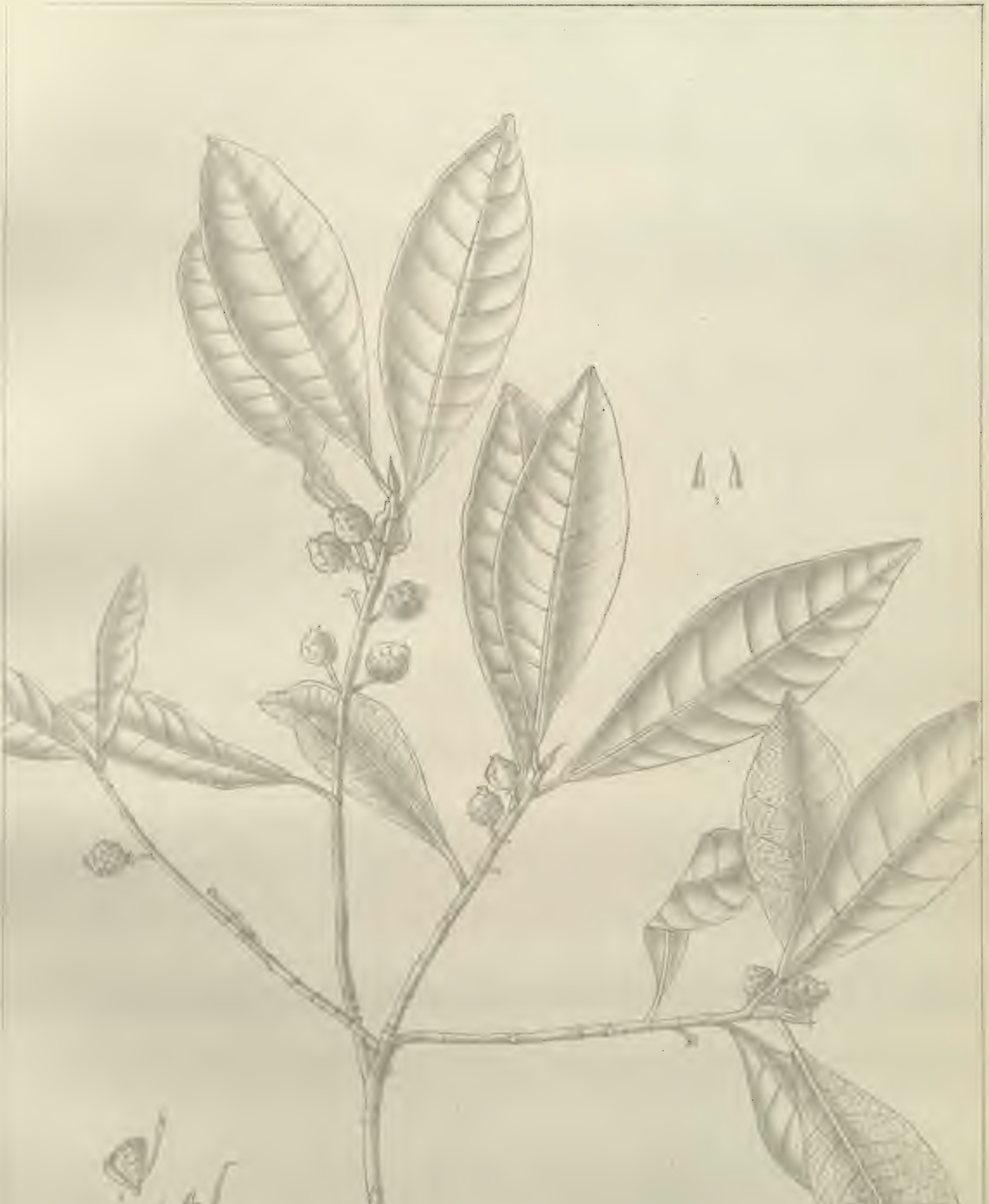
FICUS CHRYSOCARPA, Reinw.



Aghore Lal Singh del. Bot. Garden Calcutta

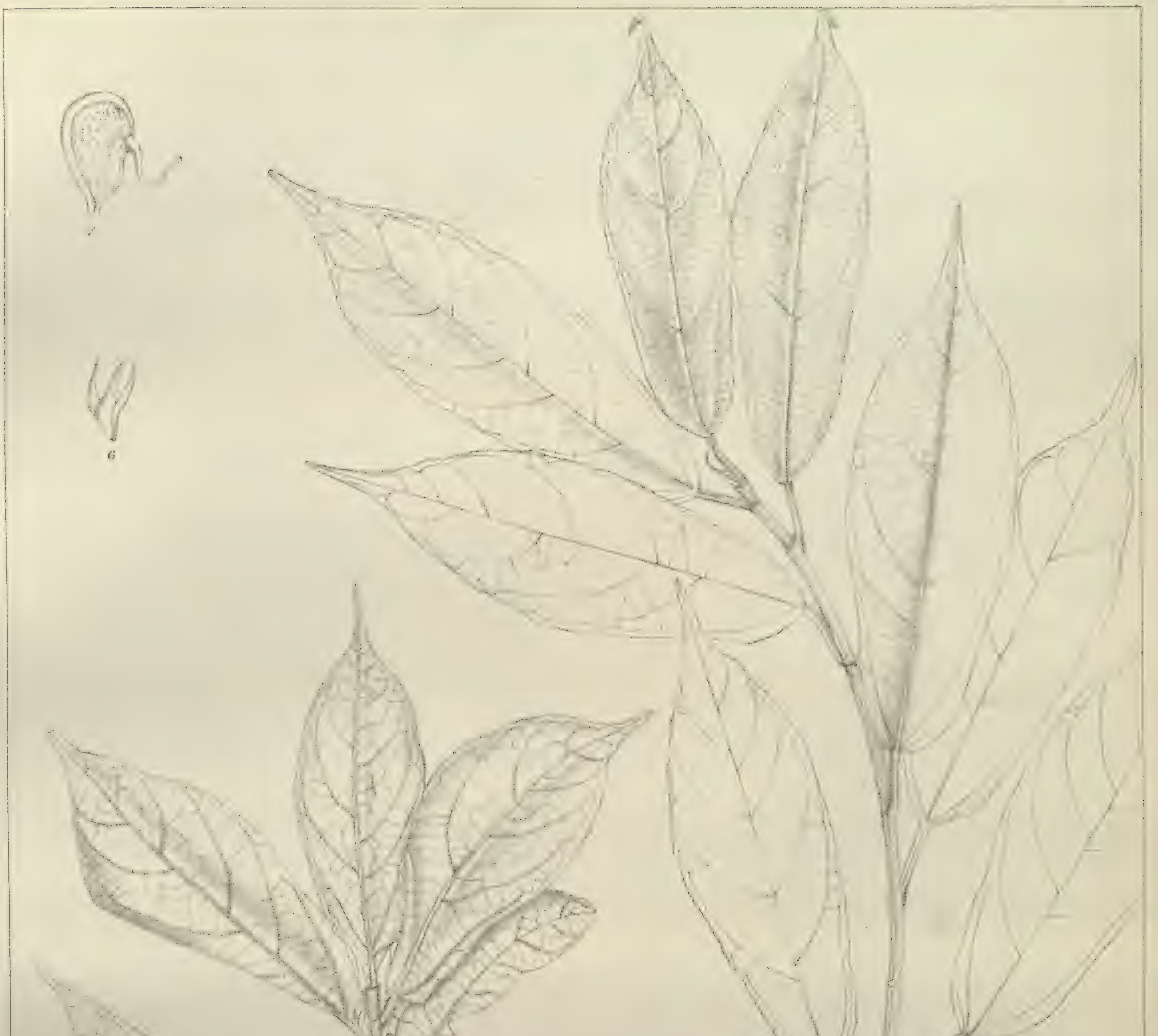
Lith. by J. C. Chuckerbutty Govt. School of Art, Calcutta.

FICUS SCHEFFERIANA, King.



[illegible] [illegible]

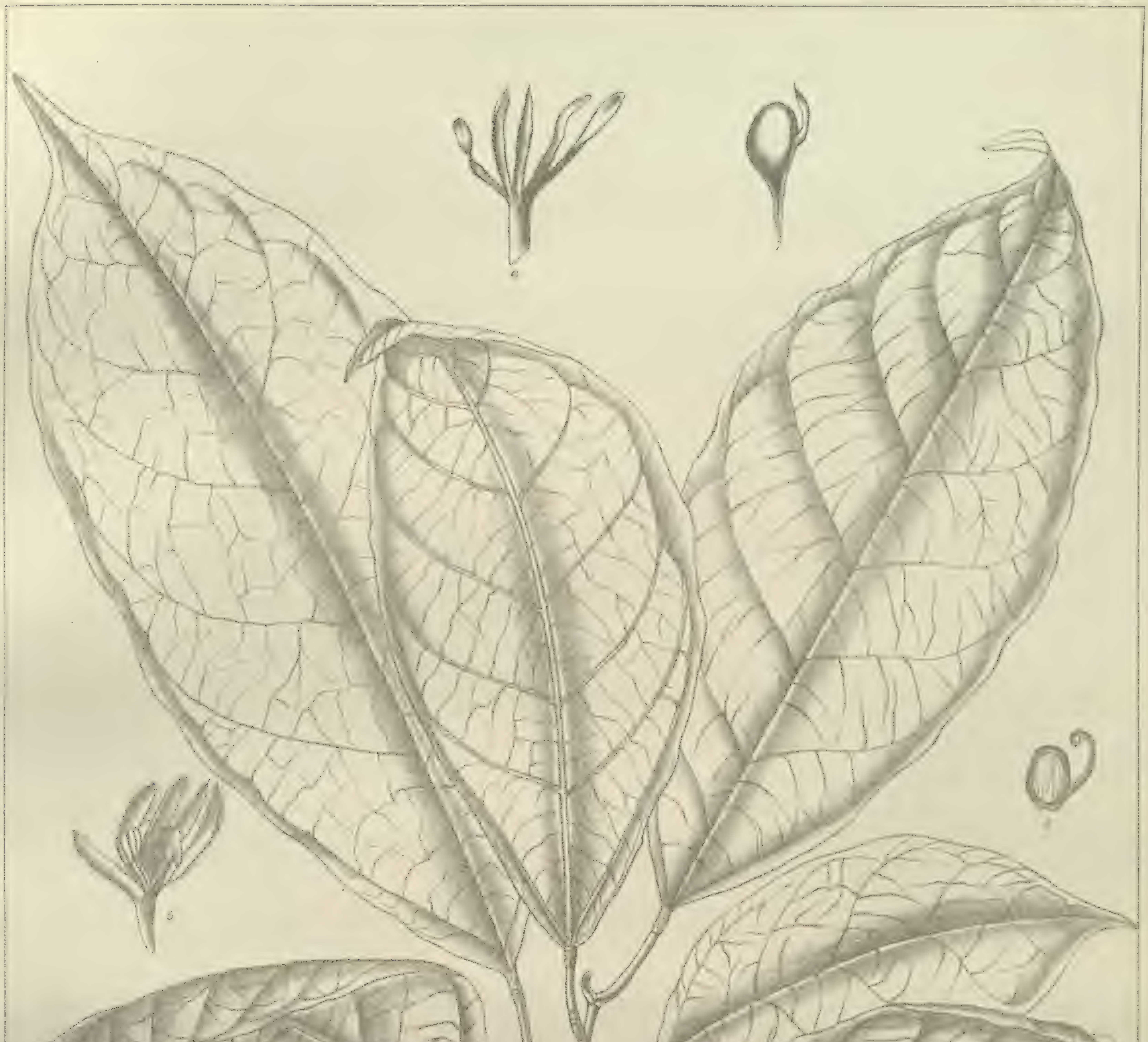
FICUS VARIOLOSA Lindl.



Aghore Lal Singh del. Bot. Garden Calcutta.

Lith. by H. C. Das Govt. Survey Office, Calcutta.

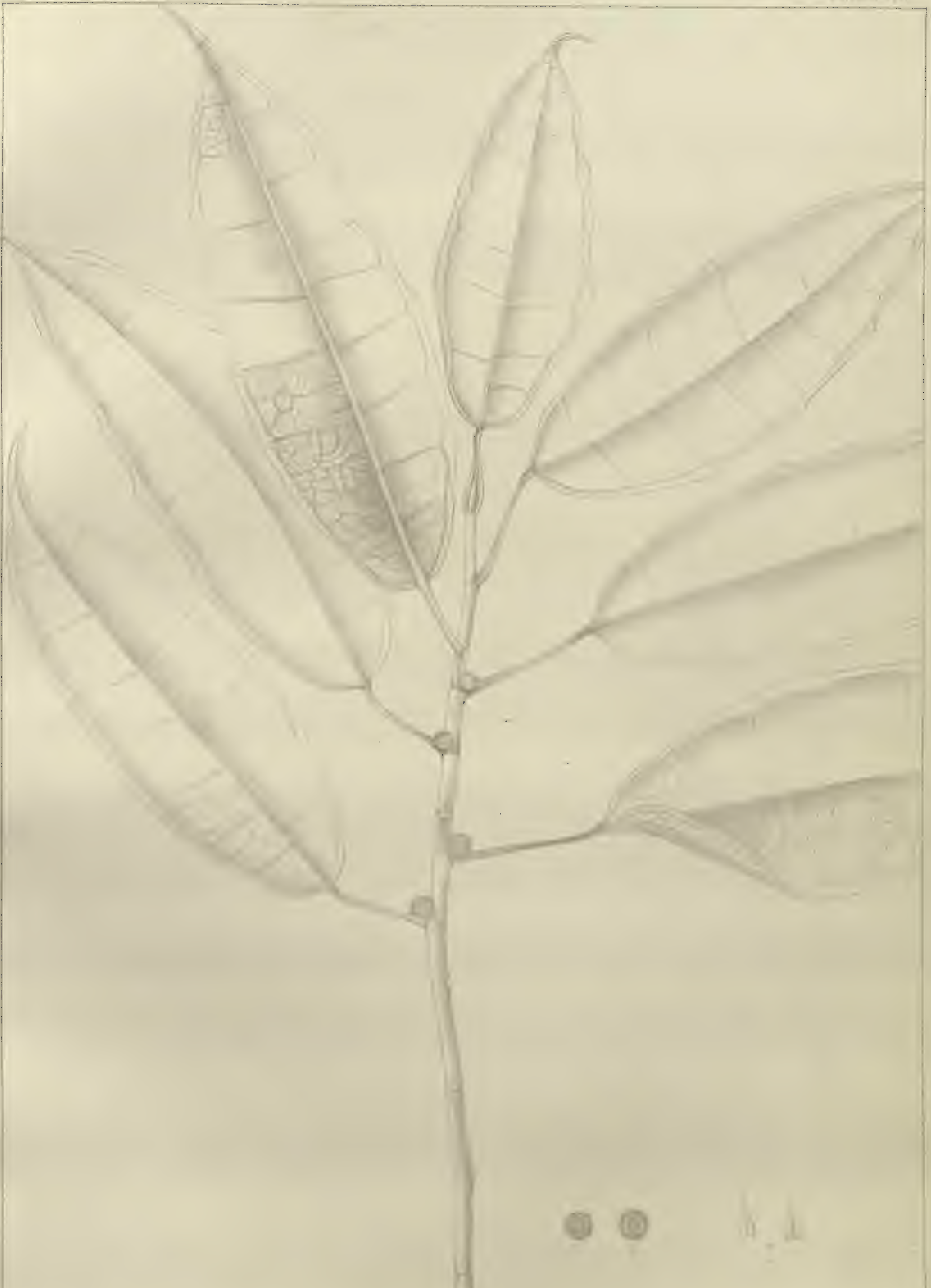
FICUS SILHETENSIS, Miq



M. Smith del.

Lith. by J. S. Chuckerbutty Govt. School of Art Calcutta.

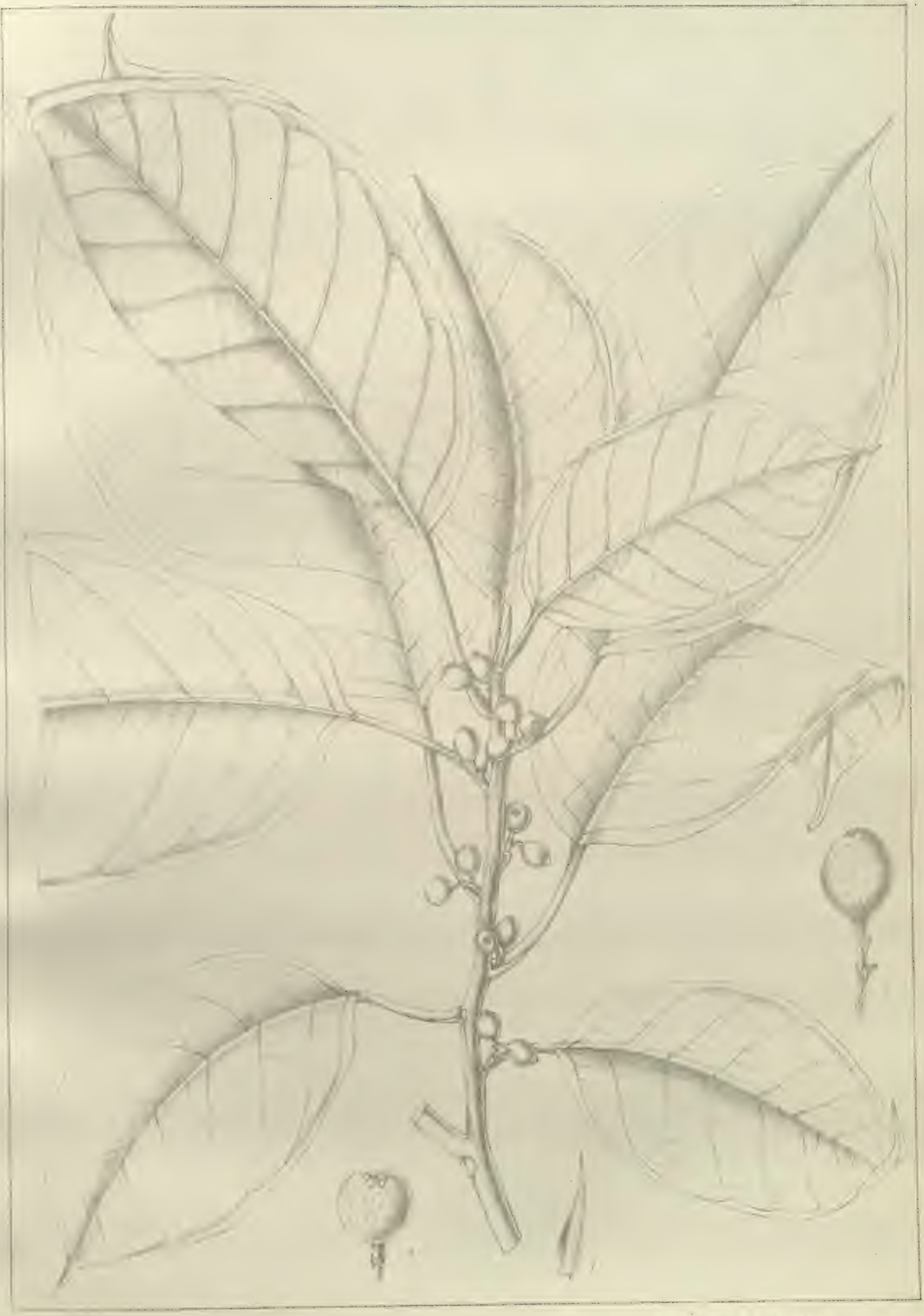
FICUS DURIUSCULA, King.



G. C. Dass del. Roy. Bot. Gard. Calcutta.

[illegible]

FICUS MACILENTA, King

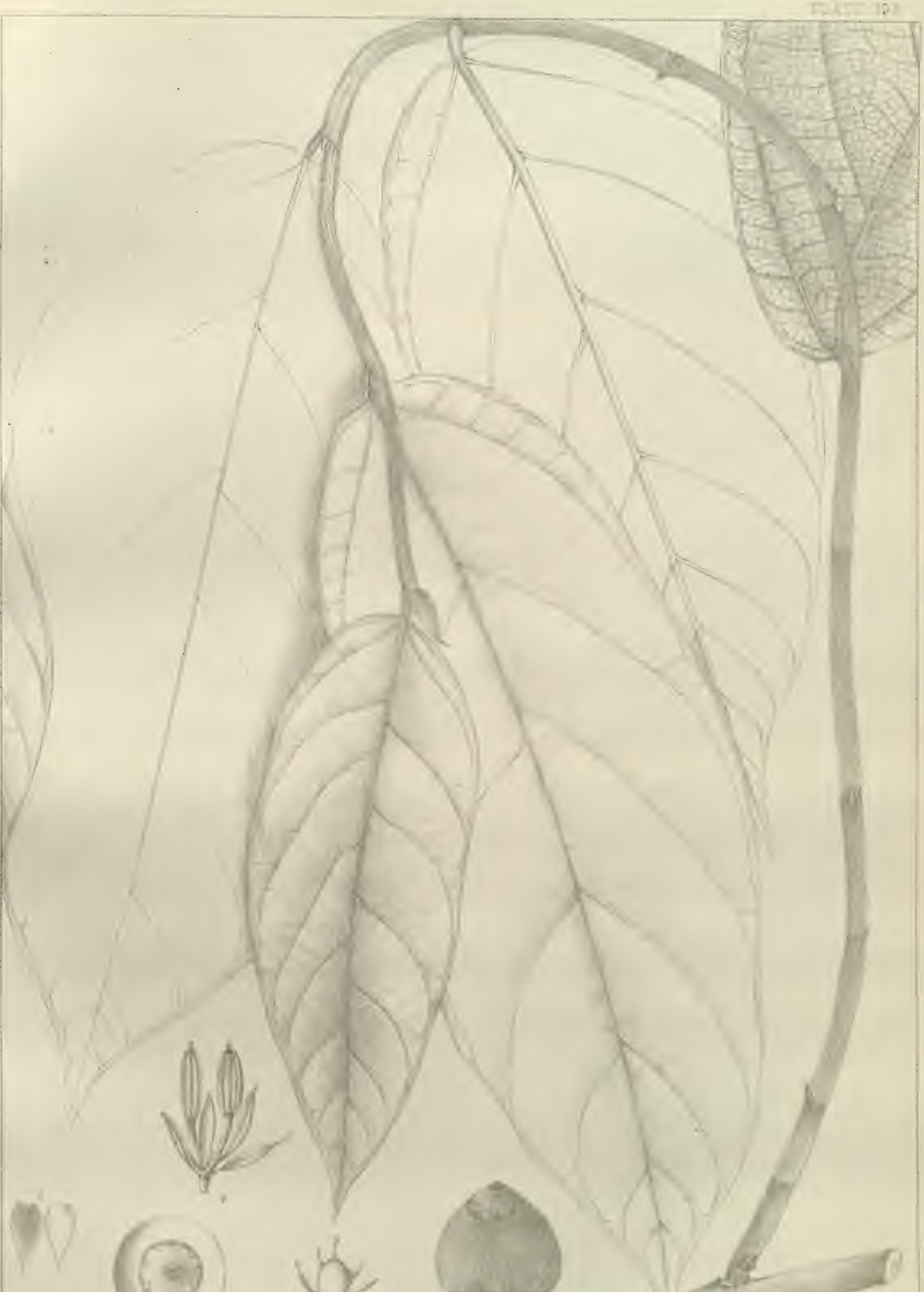


[illegible] del.

Lith by B. K. Roy Govt. School of Art Calcutta.

FICUS COMITIS, King

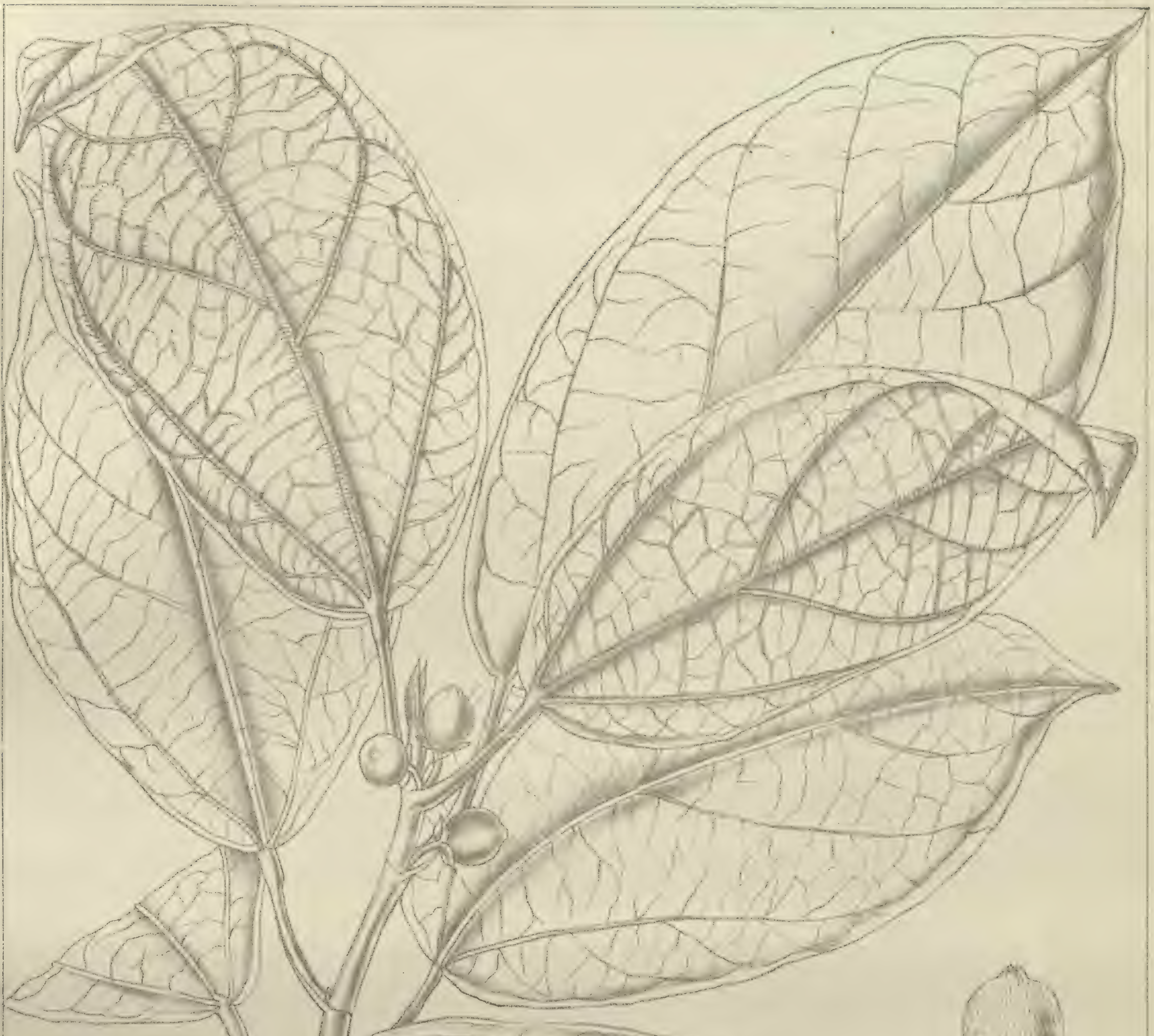
PLATE 193



[illegible] del. Bot. Garden Calcutta

Lith. by S. N. Roy Govt. School of Art Calcutta

FICUS ODOARDI, King.

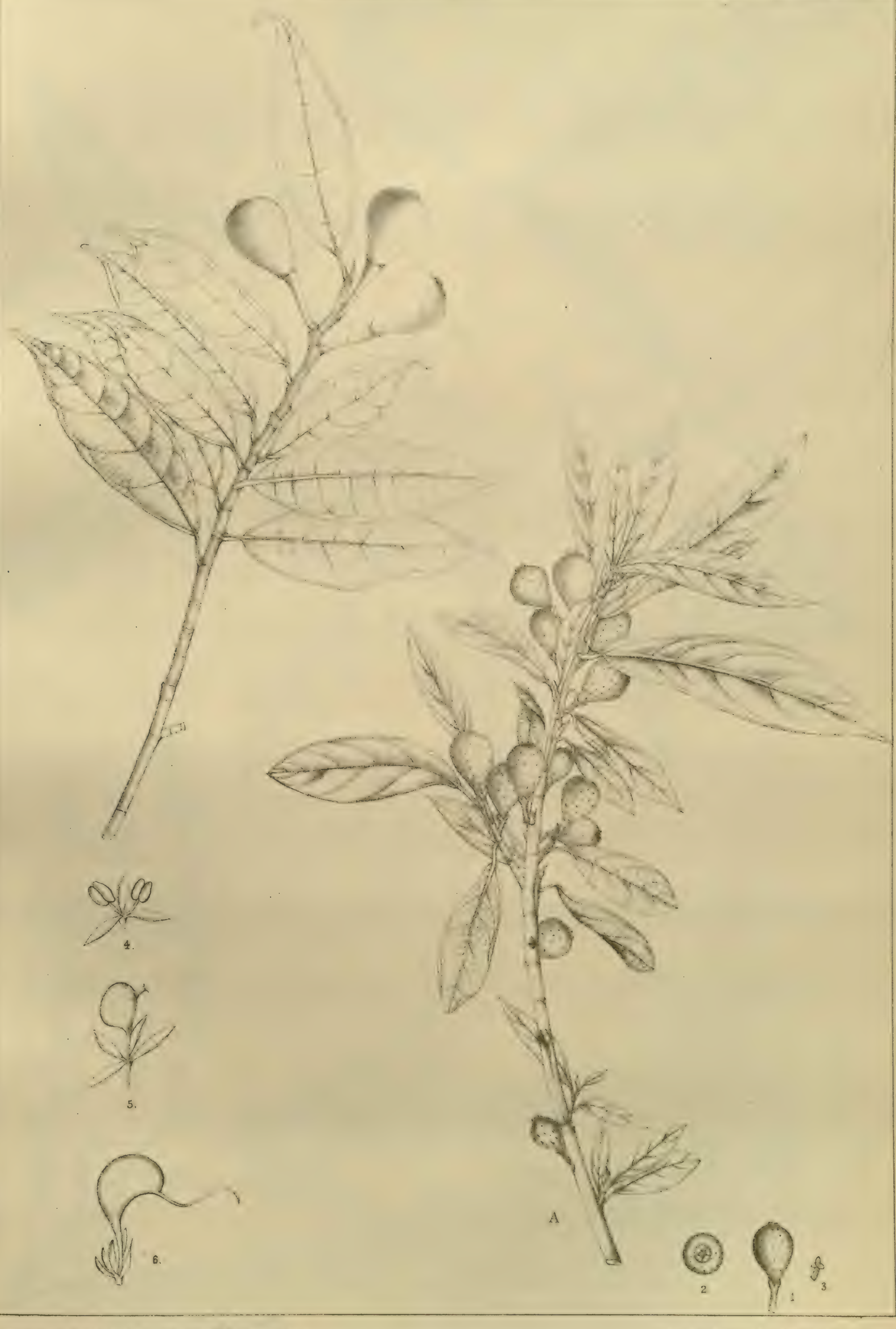


M. Smith del.

Lith. by J. C. Chuckerbutty, Govt. School of Art, Calcutta.

FICUS LEUCOPTERA, Miq.

PLATE 200

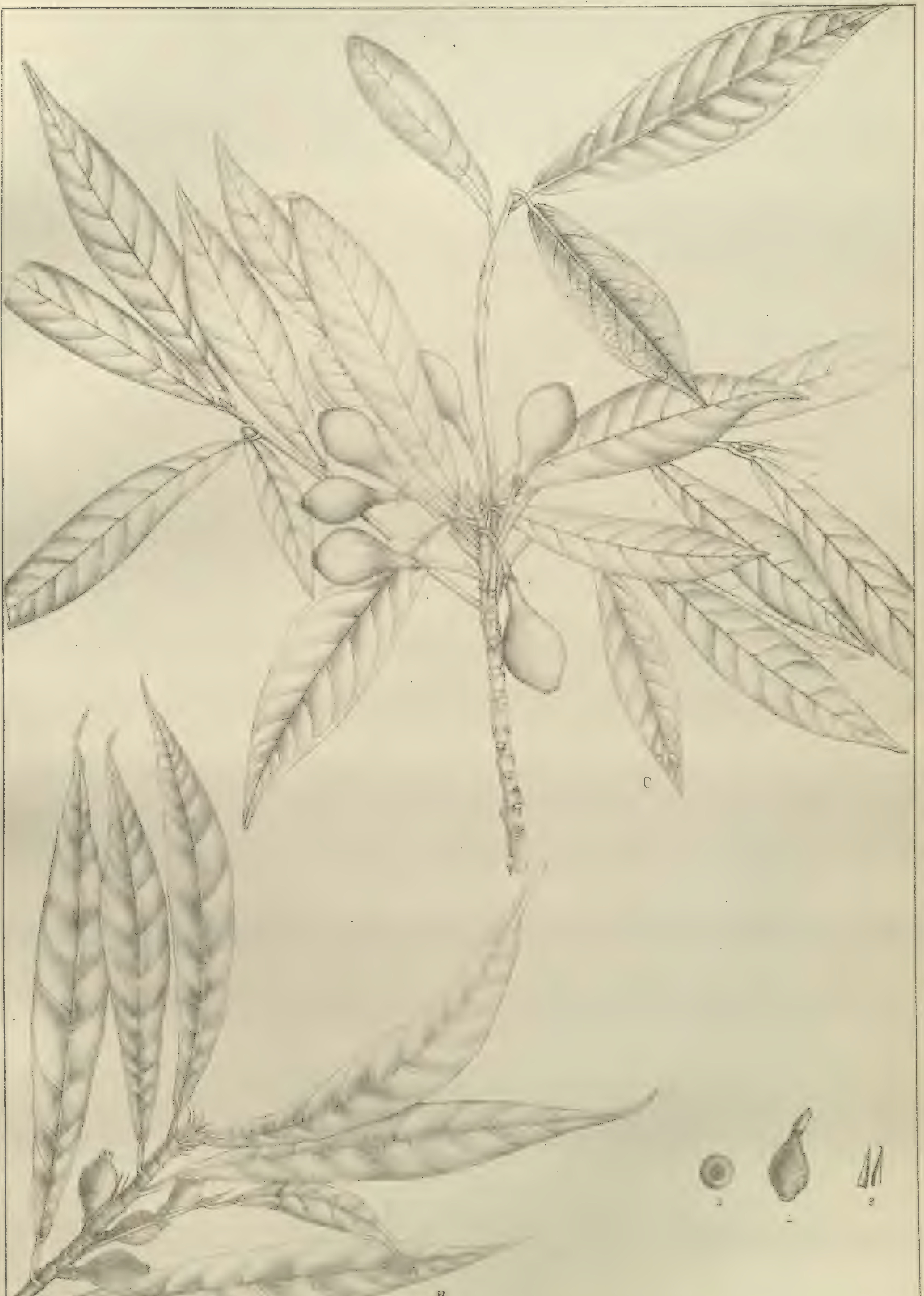


Drawn by S. Abdool Mullan, Bot. Garden Calcutta

Lith and Printed by Kristohari Das

FICUS PYRIFORMIS, Hook. & Arn.
A VAR. Abelii.

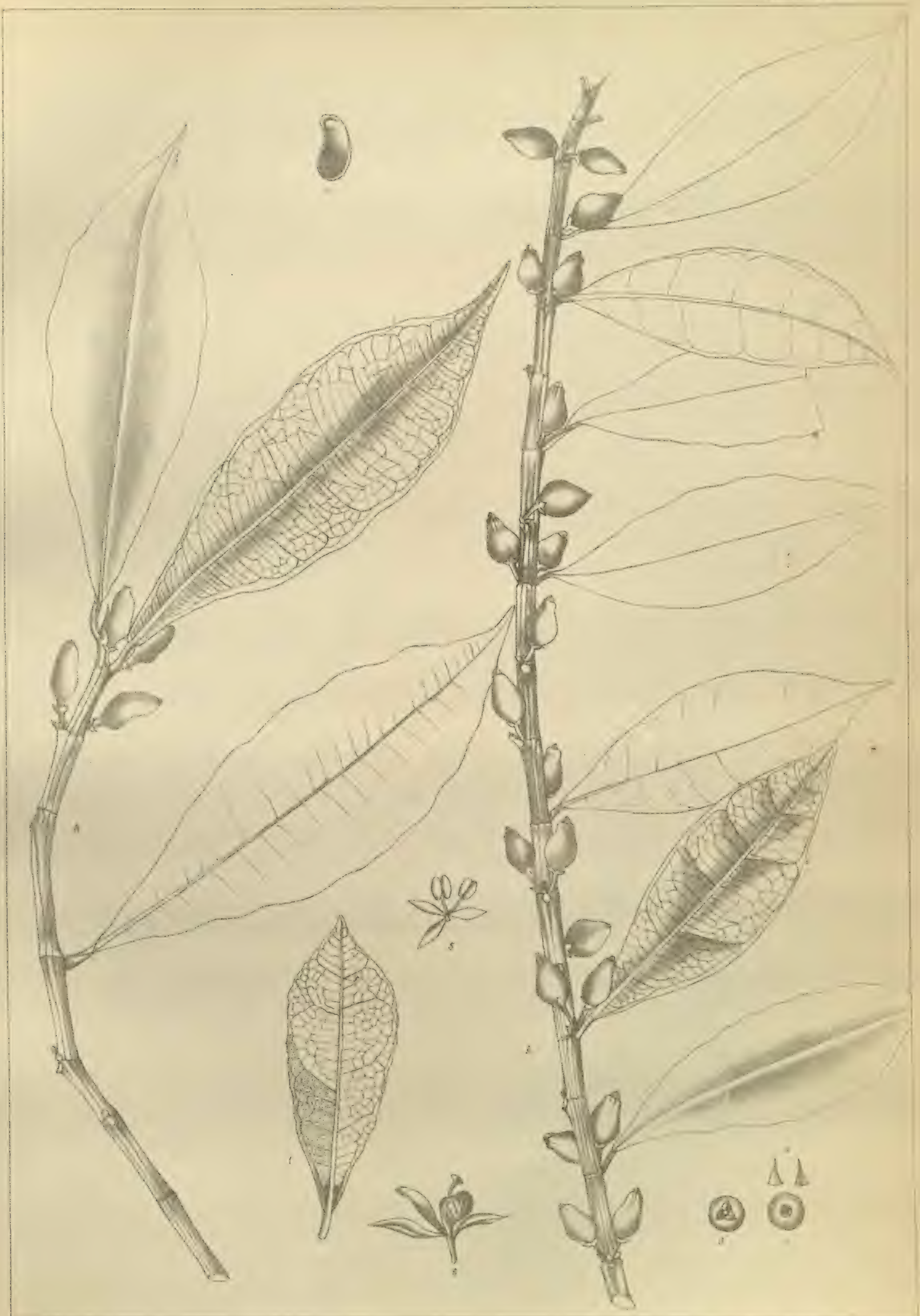
PLATE 201



Drawn by S. Abdool Mullah. Bot. Garden, Calcutta.

Lith. and Printed by Kristohari Das.

FICUS PYRIFORMIS, Hook. and Arn.
B VAR. SUB-PYRIFORMIS.
C. VAR. ISCHNOPODA.

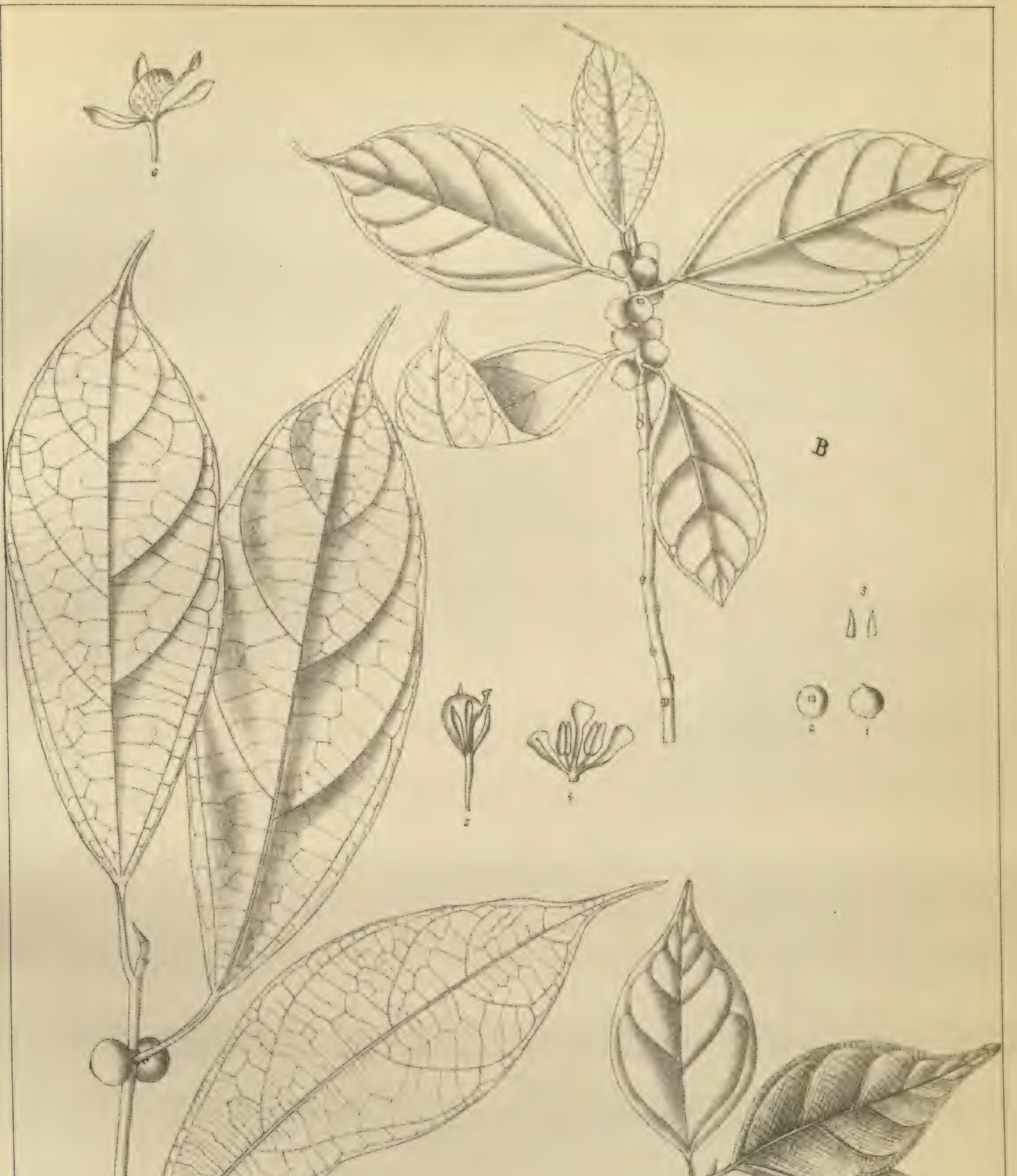


G.C. Das del. Bot. Garden Calcutta.

Lith: by H.C. Datta, Govt: School of Art, Calcutta.

FICUS MOTTLEYANA, Miq.

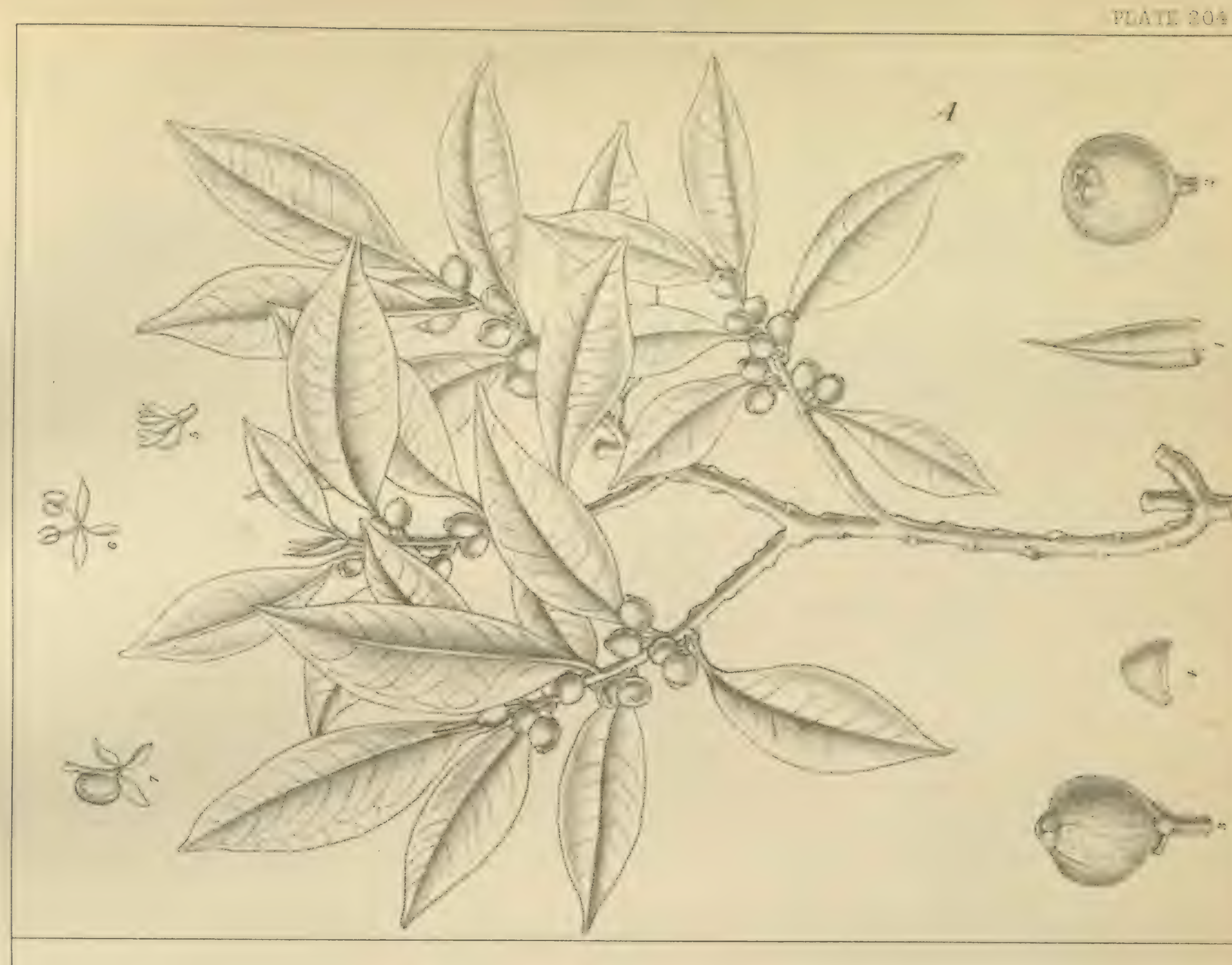
PLATE 203.

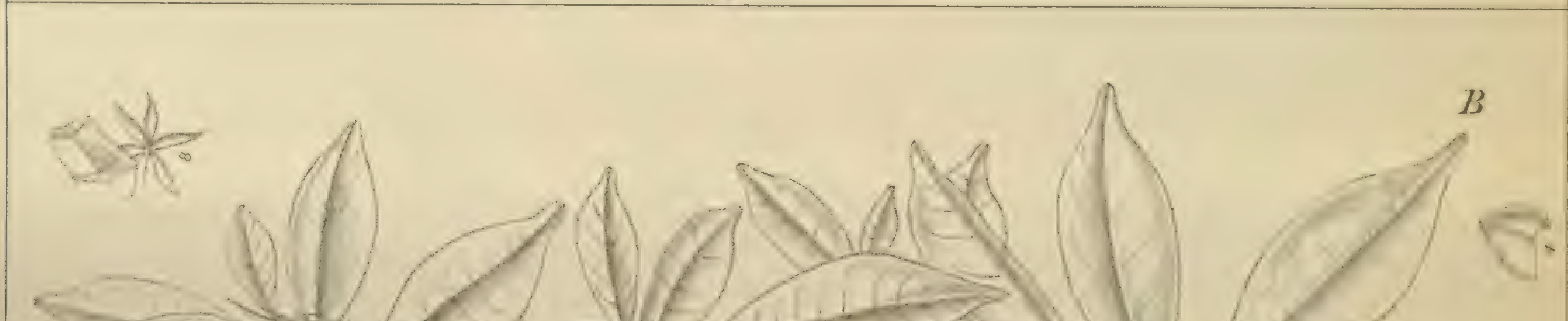


G C Das del. Bot Garden Calcutta.

Lith by H.C.Datta, Govt: School of Art, Calcutta.

(A) FICUS CHARTACEA, WALL. (B & C) VAR. TORULOSA.



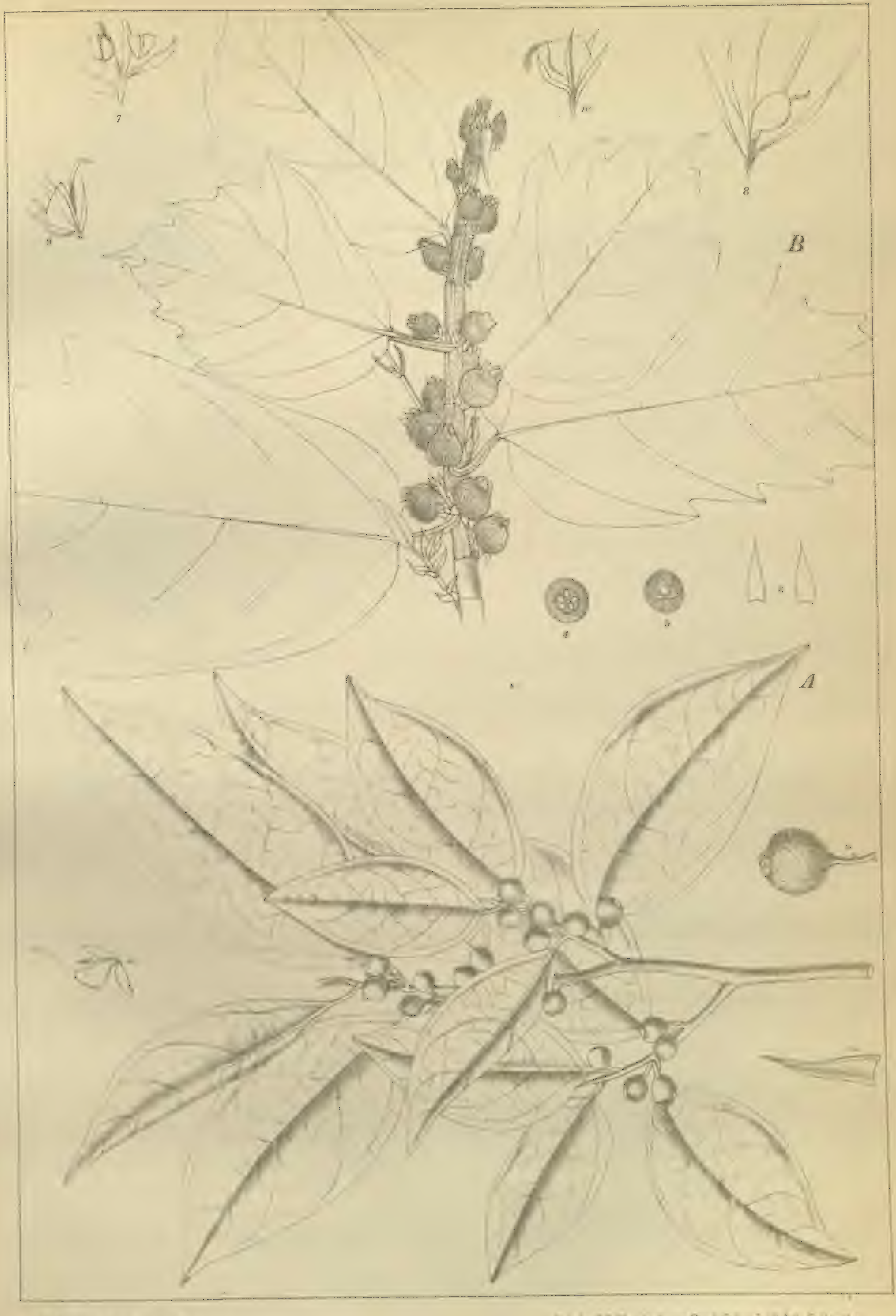


M. Smith del.

Lith. by J. K. Bhattacharya Govt. School of Art Calcutta.

A. FICUS PAUPER, King.

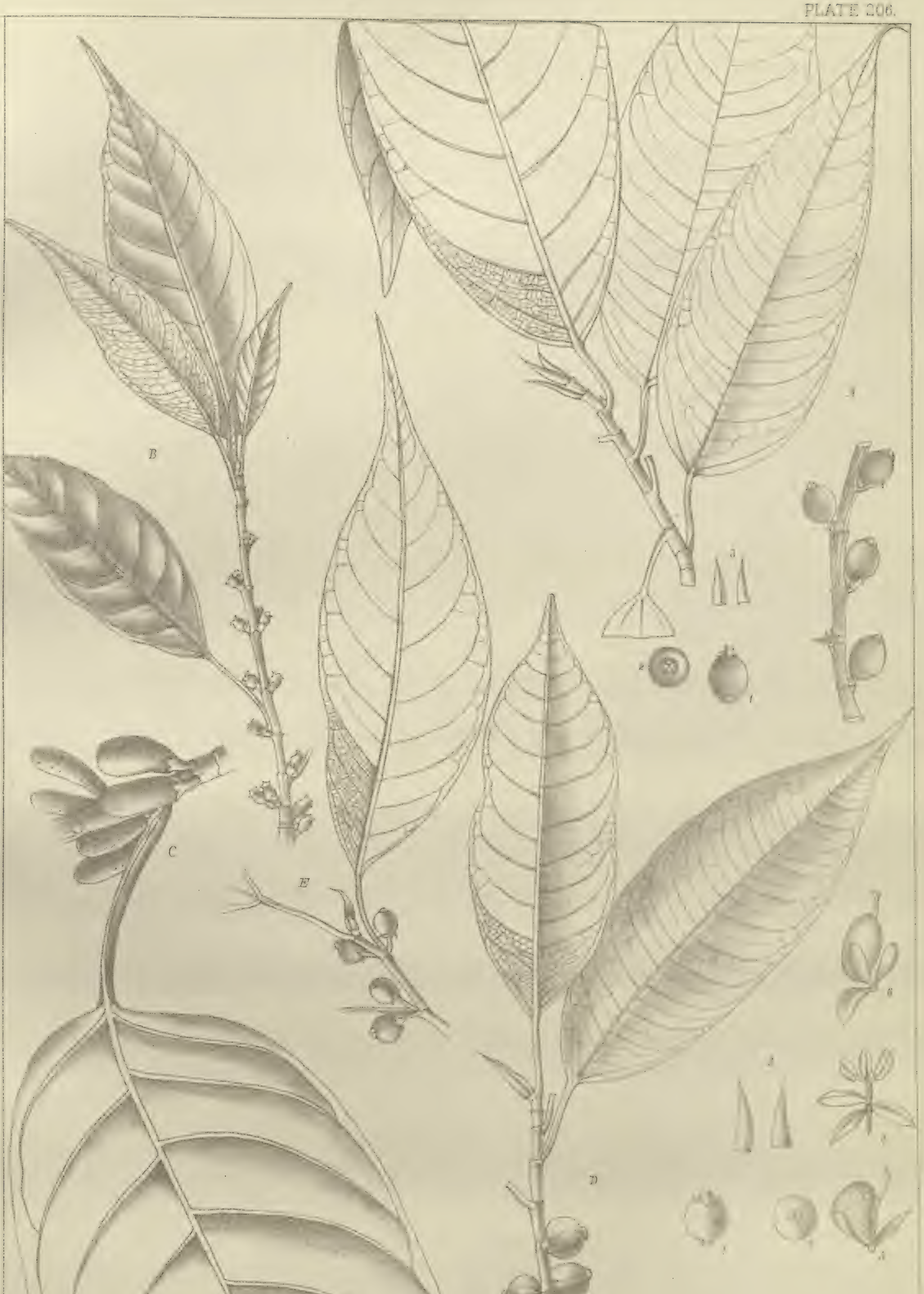
B. FICUS OLEAEFOLIA, King.



J.C. Das, del. Bot. Garden Calcutta.

Lith. by J.K. Chuckerbutty Govt. School of Art, Calcutta.

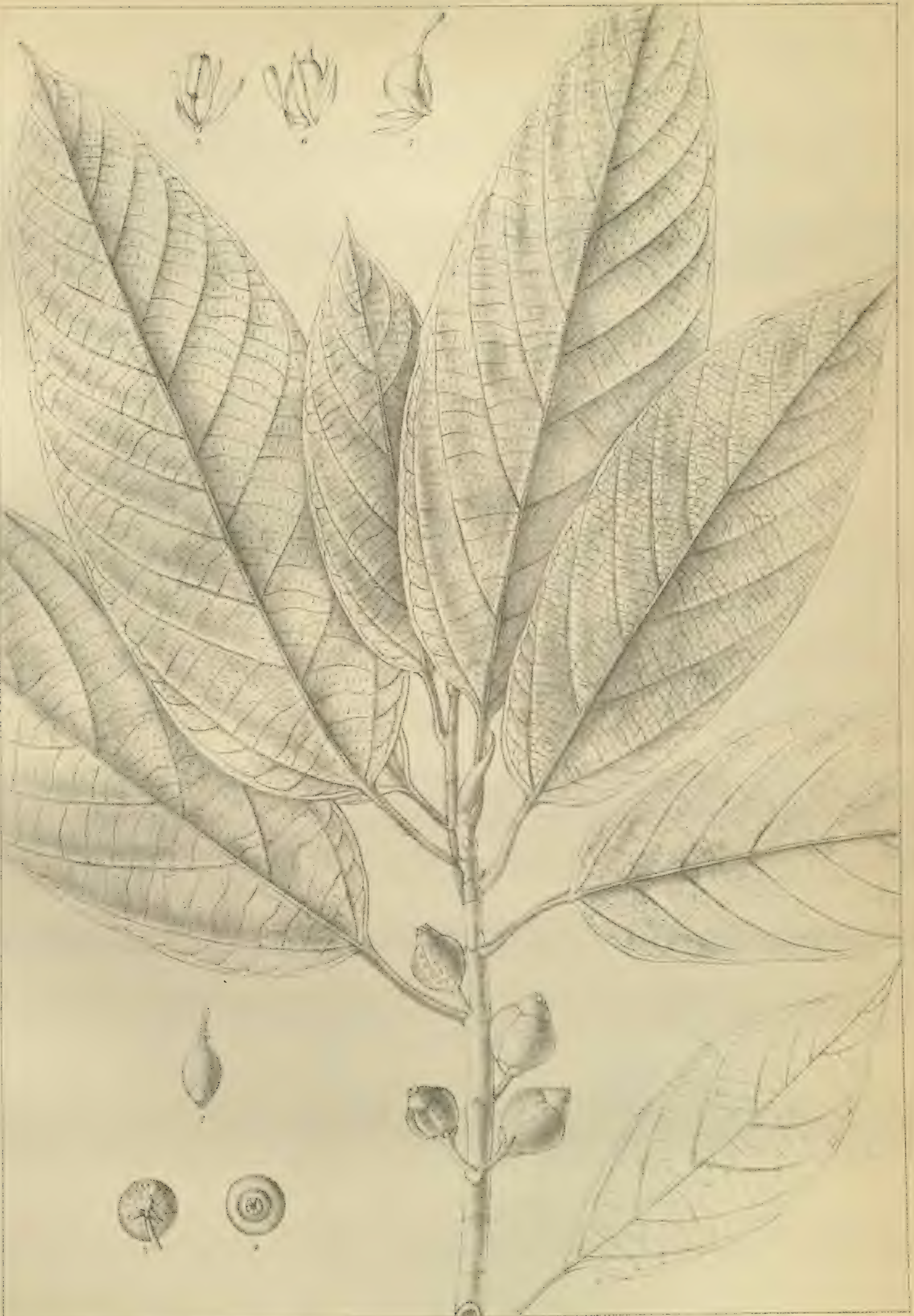
A. FICUS SORONENSIS. King.
B. " BHOTANICA. King.



A. J. Singh del. Bot. Garden Calcutta.

Lith. by J. C. Chuckerbutty Govt. School of Art Calcutta.

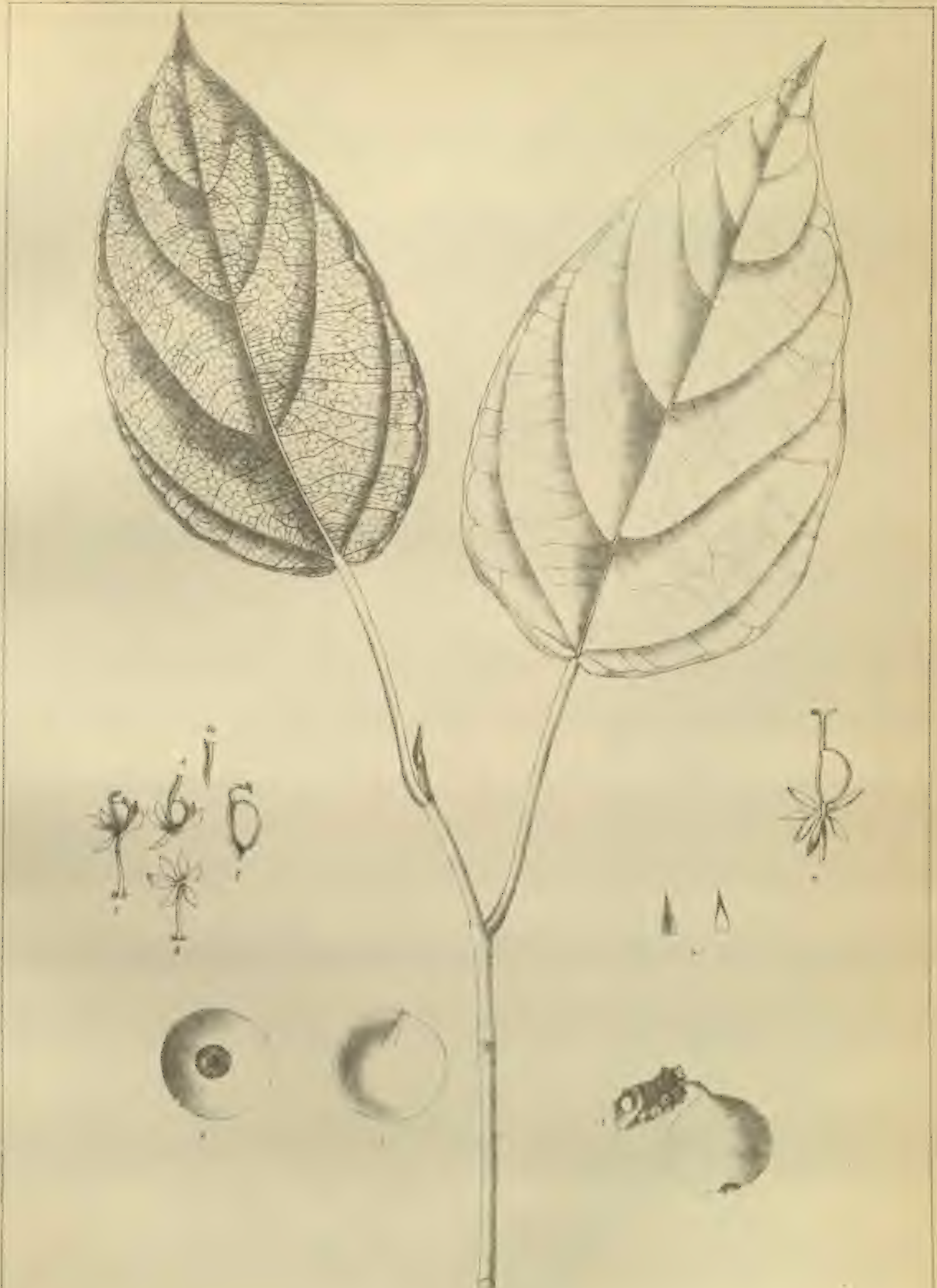
FICUS NEMORALIS, Wall.



G. C. Das del Bot Garden Calcutta

Lith by J. E. Bhattacharji Govt School of Art Calcutta

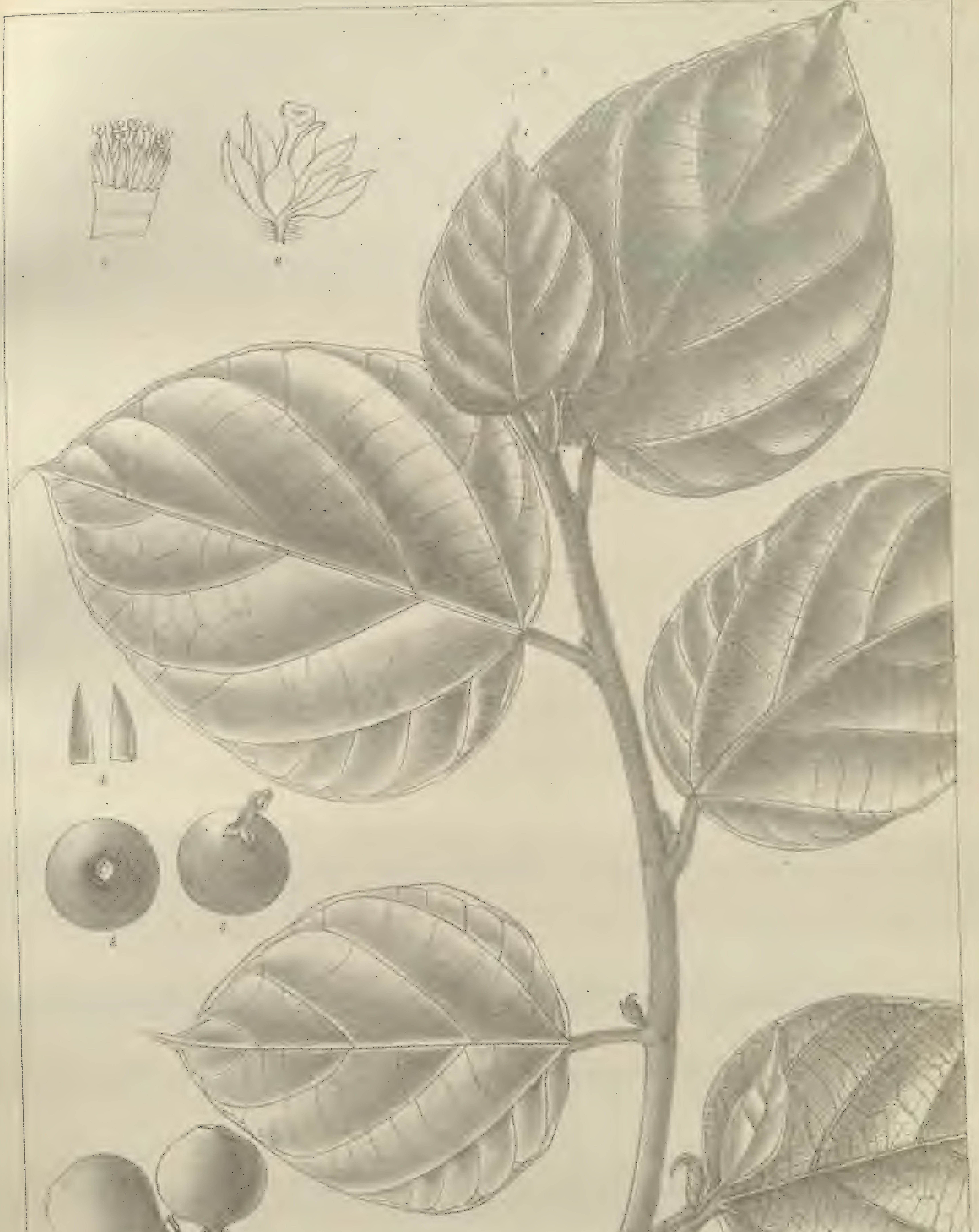
FICUS LEPIDOSA, Wall.



G.C.Das del. Bot. Garden Calcutta.

Lith by H.C.Datta, Govt. School of Art, Calcutta.

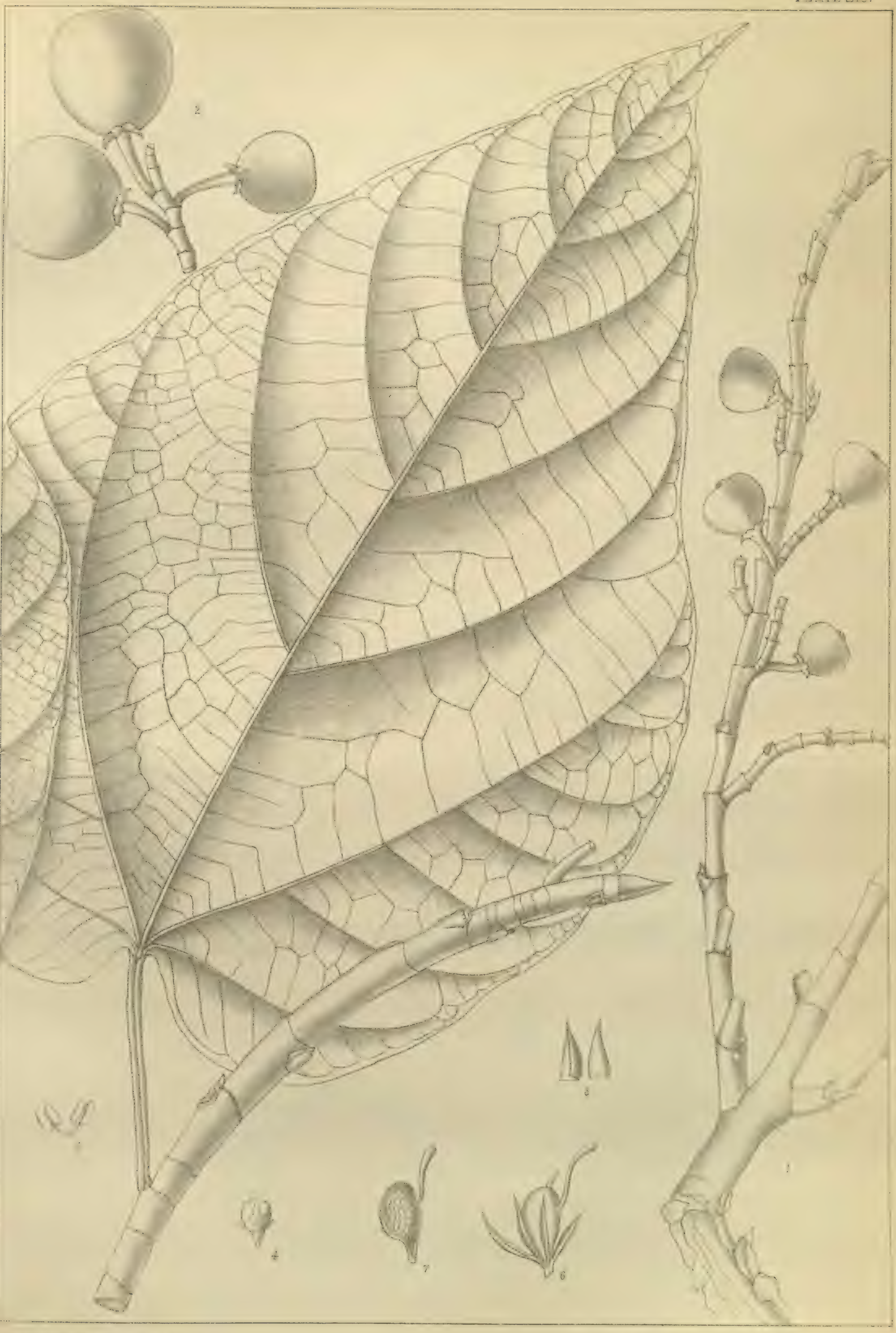
FICUS MACROCARPA, WIGHT.



Lith by J. C. Chuckerbutty, Govt. School of Arts, Calcutta.

A. L. Singh del. Bot Garden Calcutta.

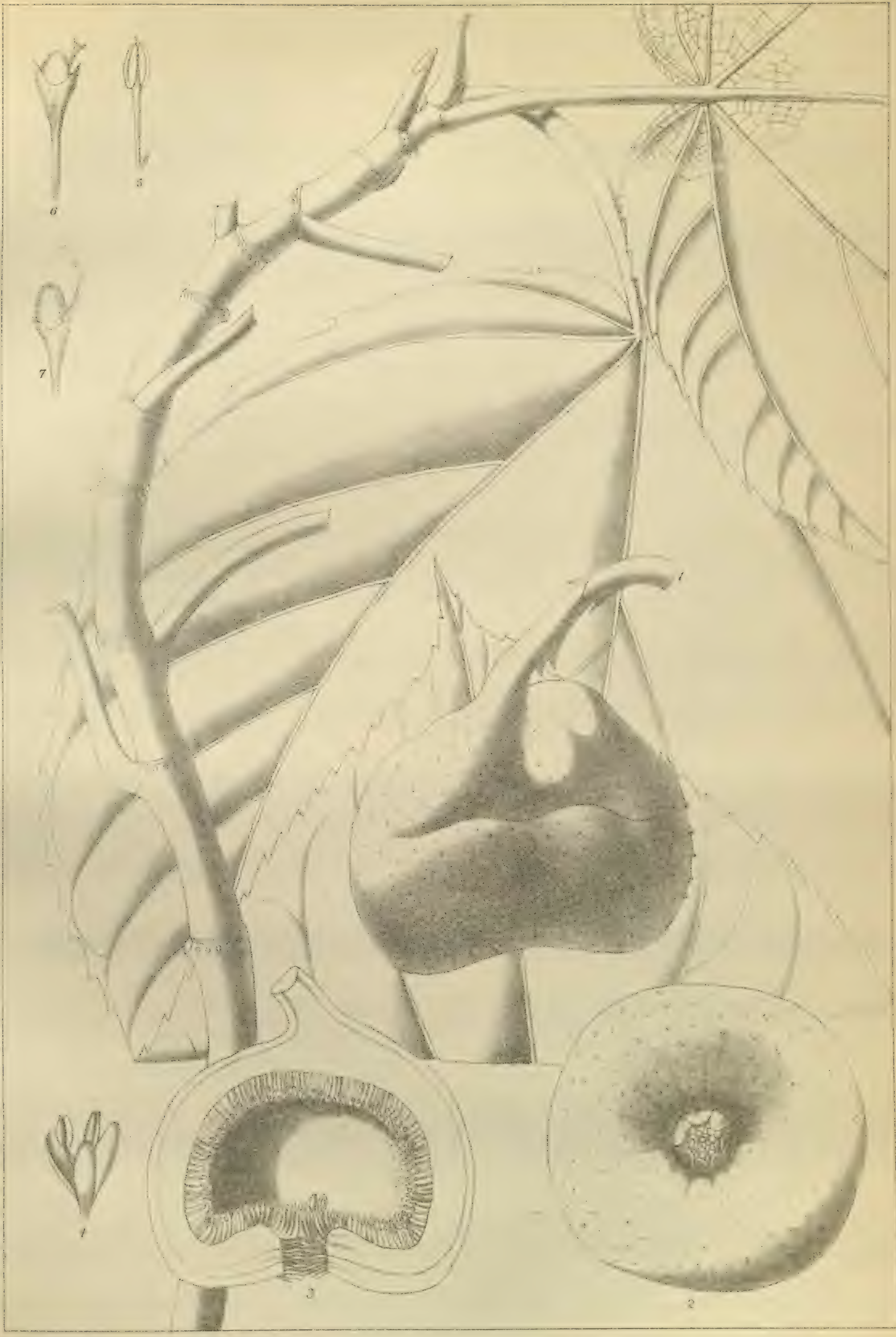
FICUS GUTTATA, Wight.



A. L. Singh, del. Bot: Garden Calcutta.

Lith by J.C.Chuckerbutty, Govt. School of Art, Calcutta.

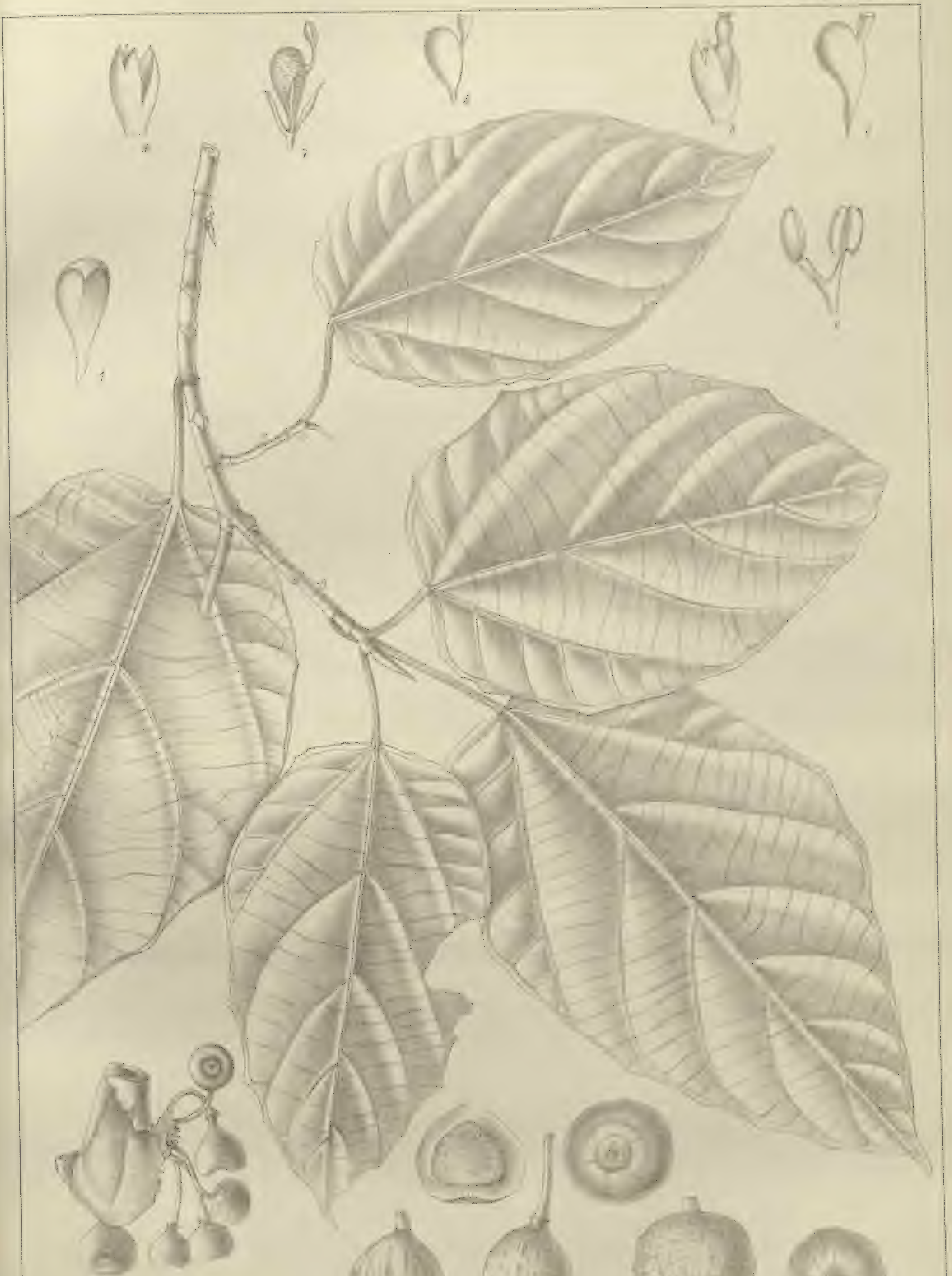
FICUS NODOSA, Teysm. et Binnend.



Drawn by Gopal Chunder Doss, Bot. Garden, Calcutta.

Lith: by J. C. Chuckerbutty, Govt. School of Art, Calcutta.

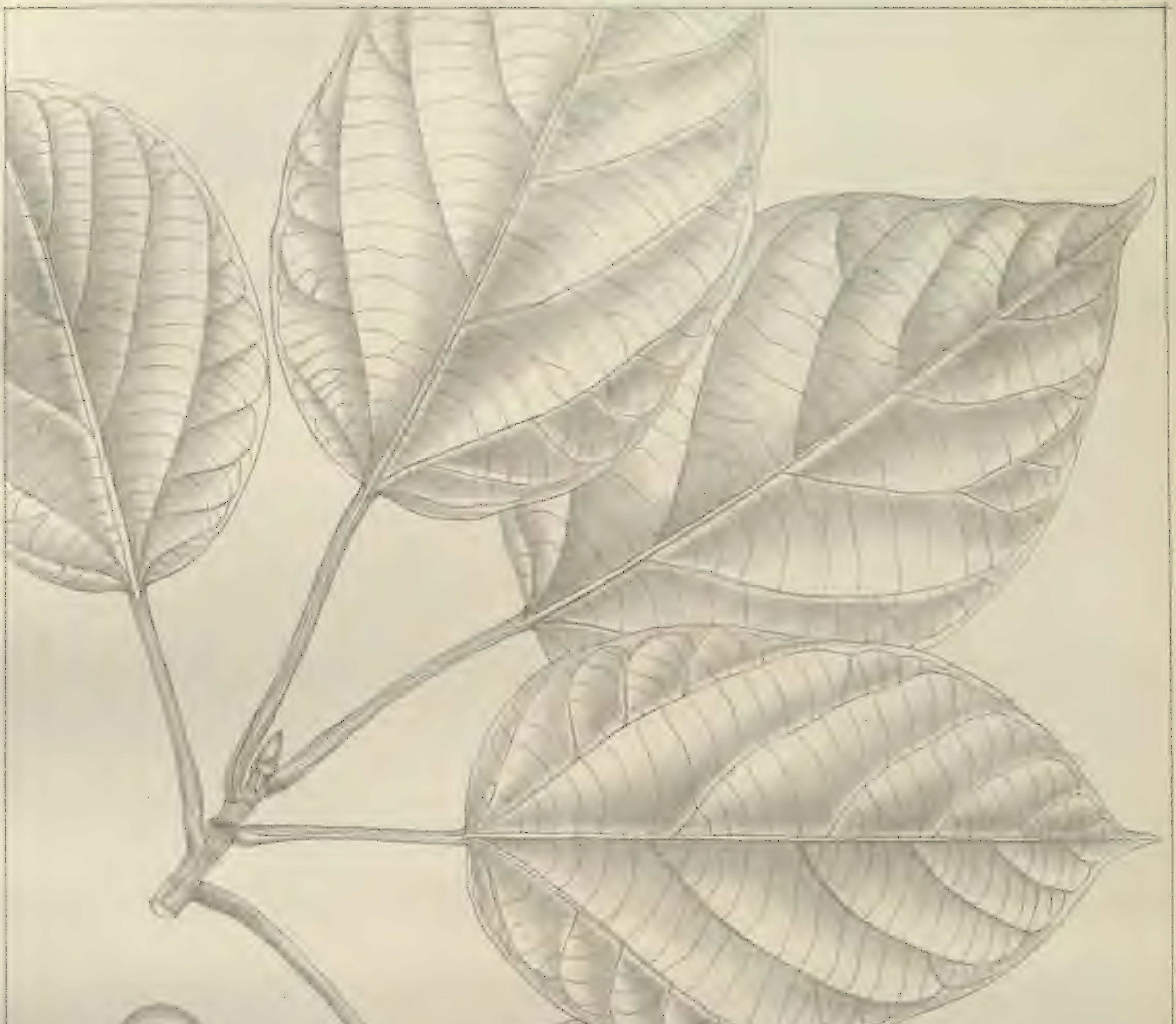
FICUS ROXBURGHII, Wall.



A. L. Singh del. Bot. Garden Calcutta.

Lith. by J. C. Chuckerbutty Govt. School of Art Calcutta.

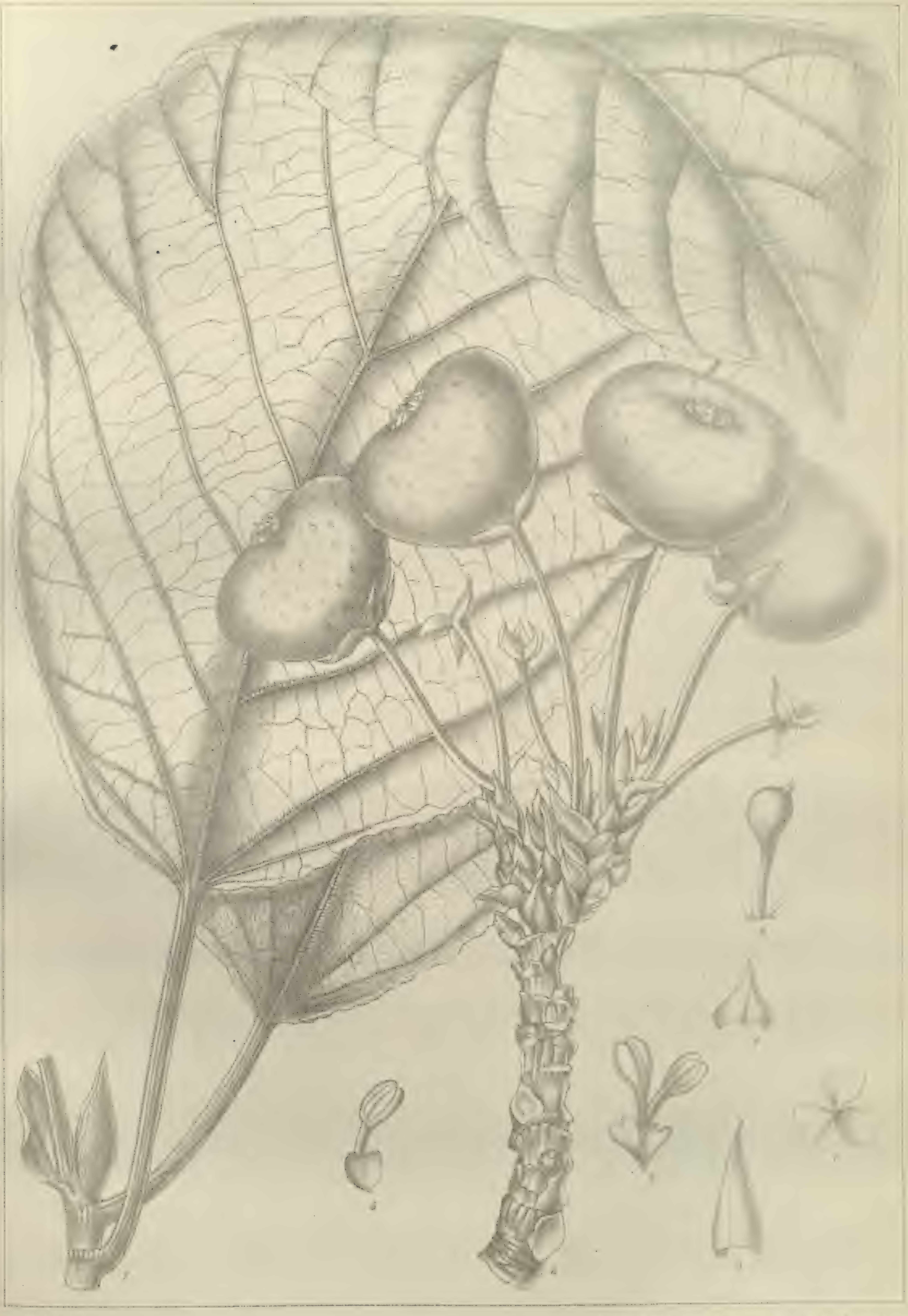
FICUS VARIEGATA, Bl.



G. C. Das del. Bot. Garden Calcutta.

Lith. by J. C. Chuckerbutty, Govt School of Art, Calcutta.

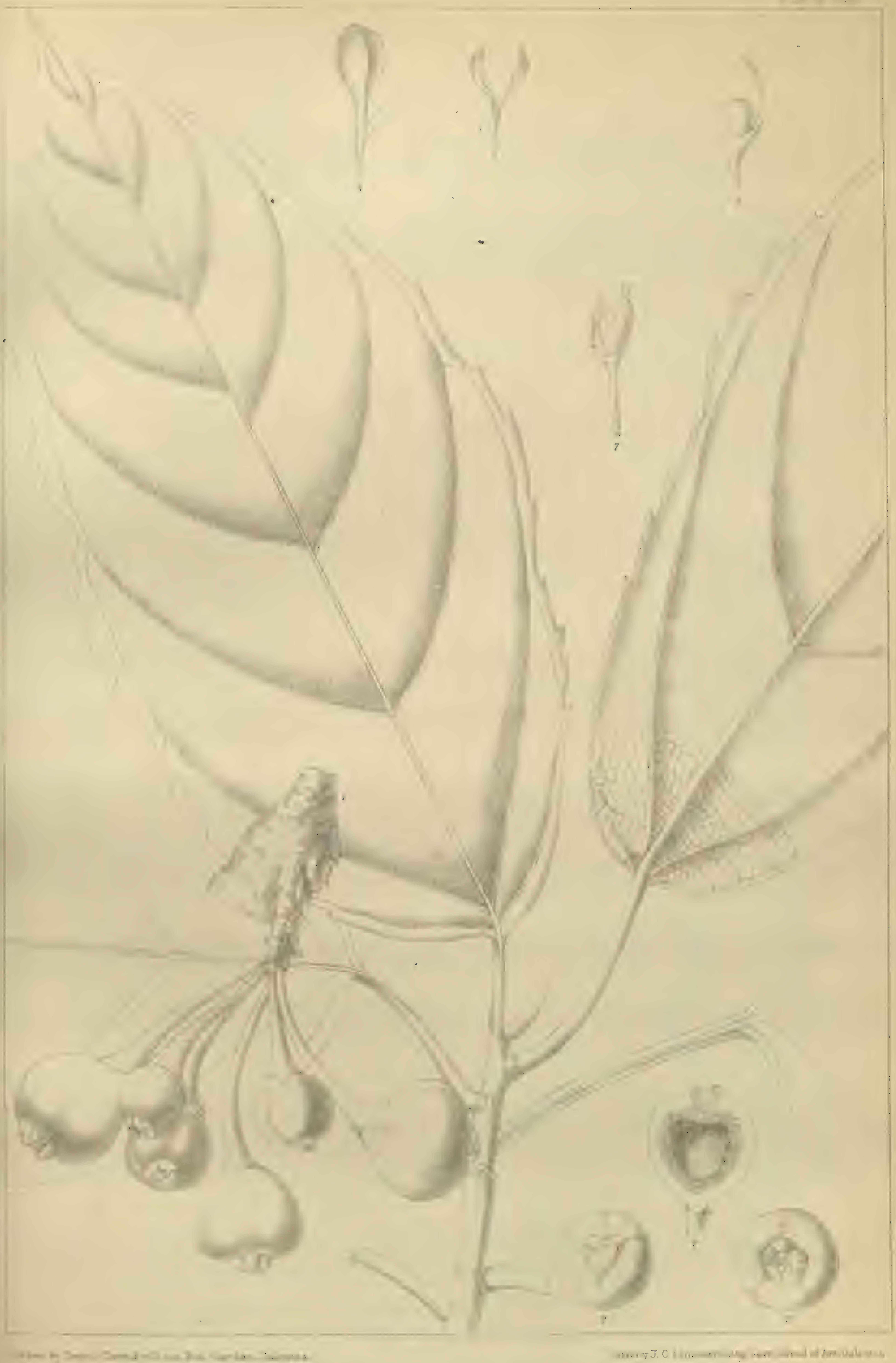
FICUS VARIEGATA, Bl. Var. Chlorocarpa.



M. [illegible] del.

Lith. by J. C. Ghose at the Govt. Botanic Gard. Calcutta.

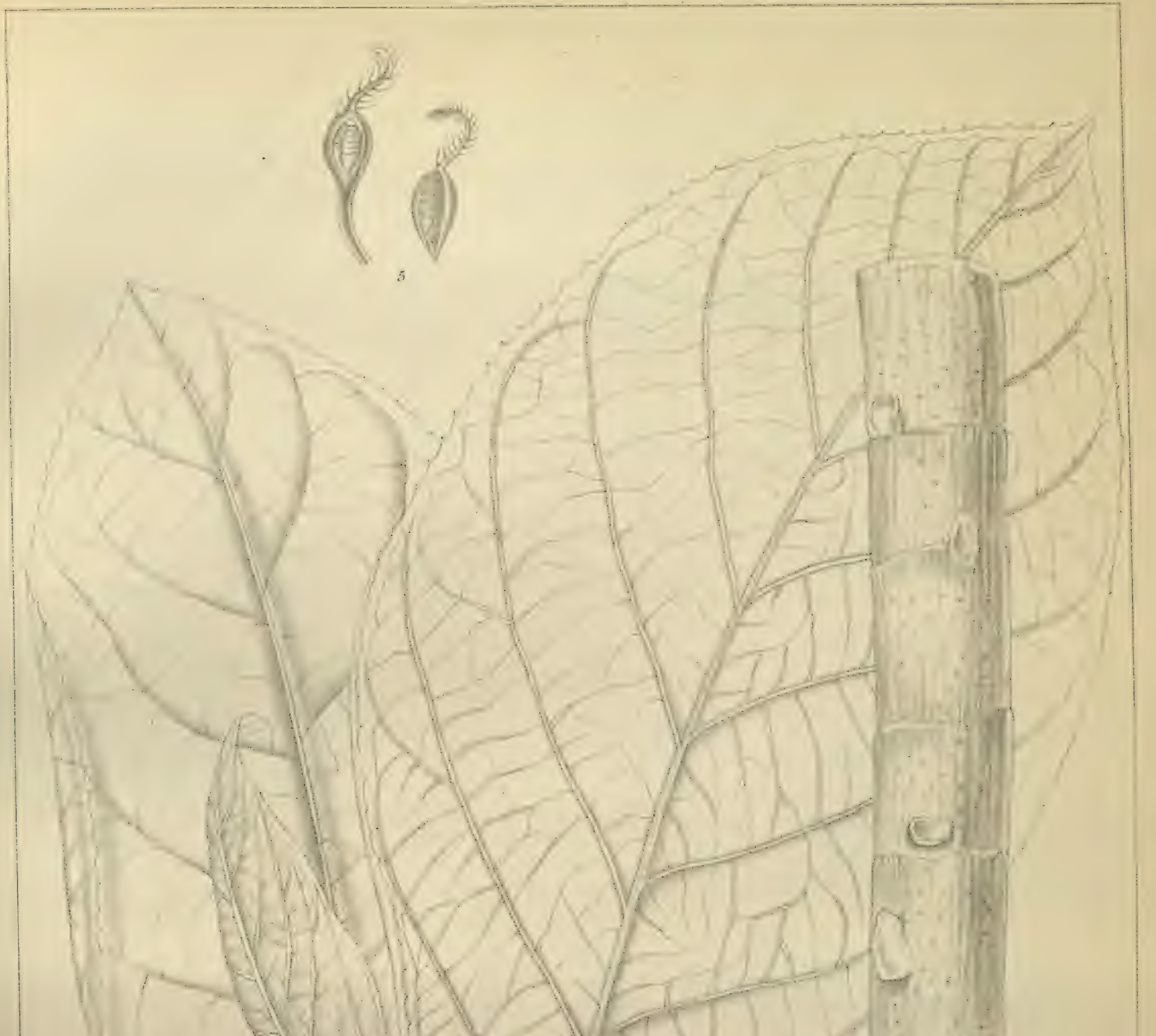
FICUS GRANDIS, King.



[illegible]

[illegible] J. C. [illegible]

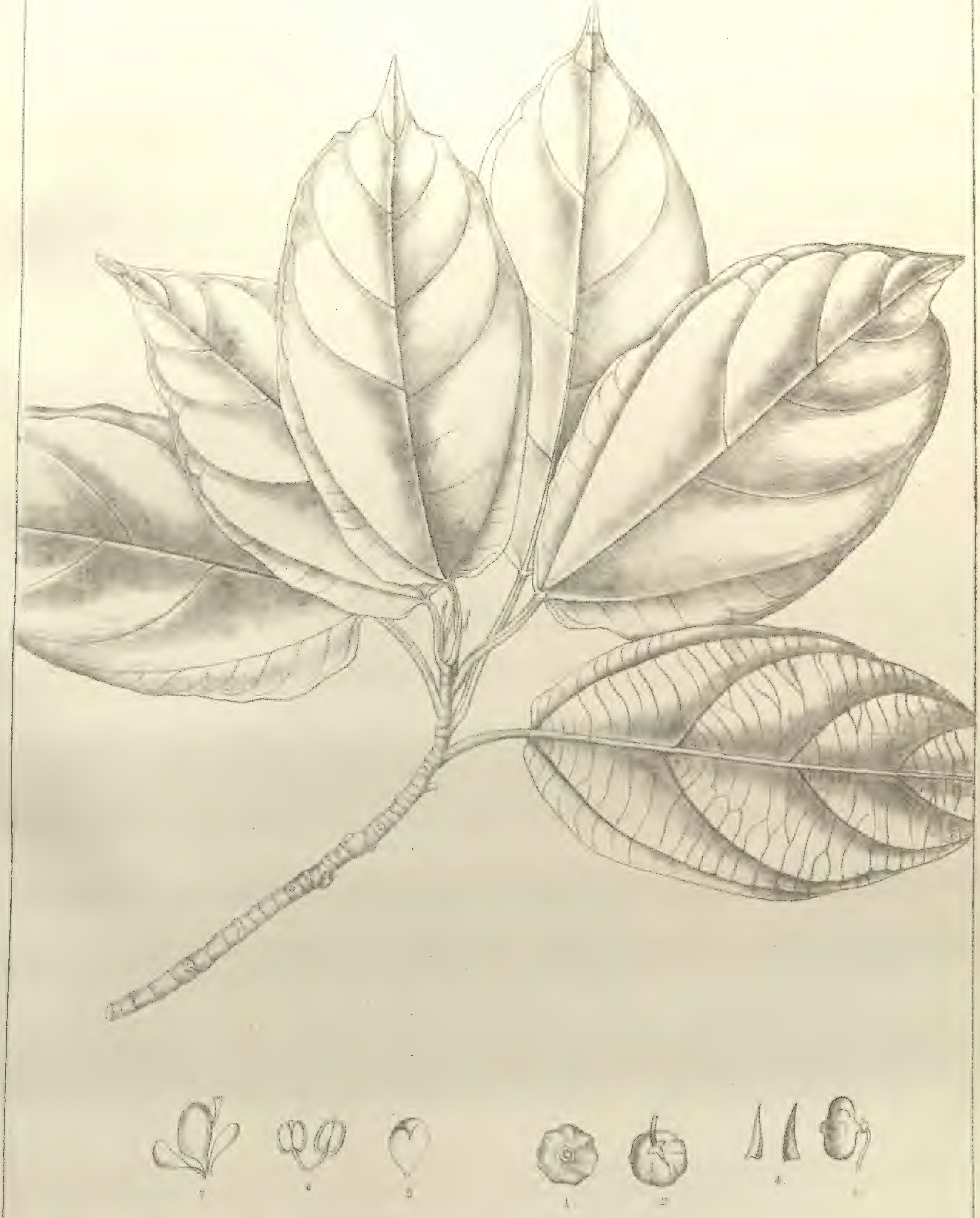
FICUS FUMIFERA, Wall.



Drawn by Gopal Chunder Dass. Bot. Garden, Calcutta.

Lith. by J. C. Chuckerbutty, Govt. School of Art, Calcutta.

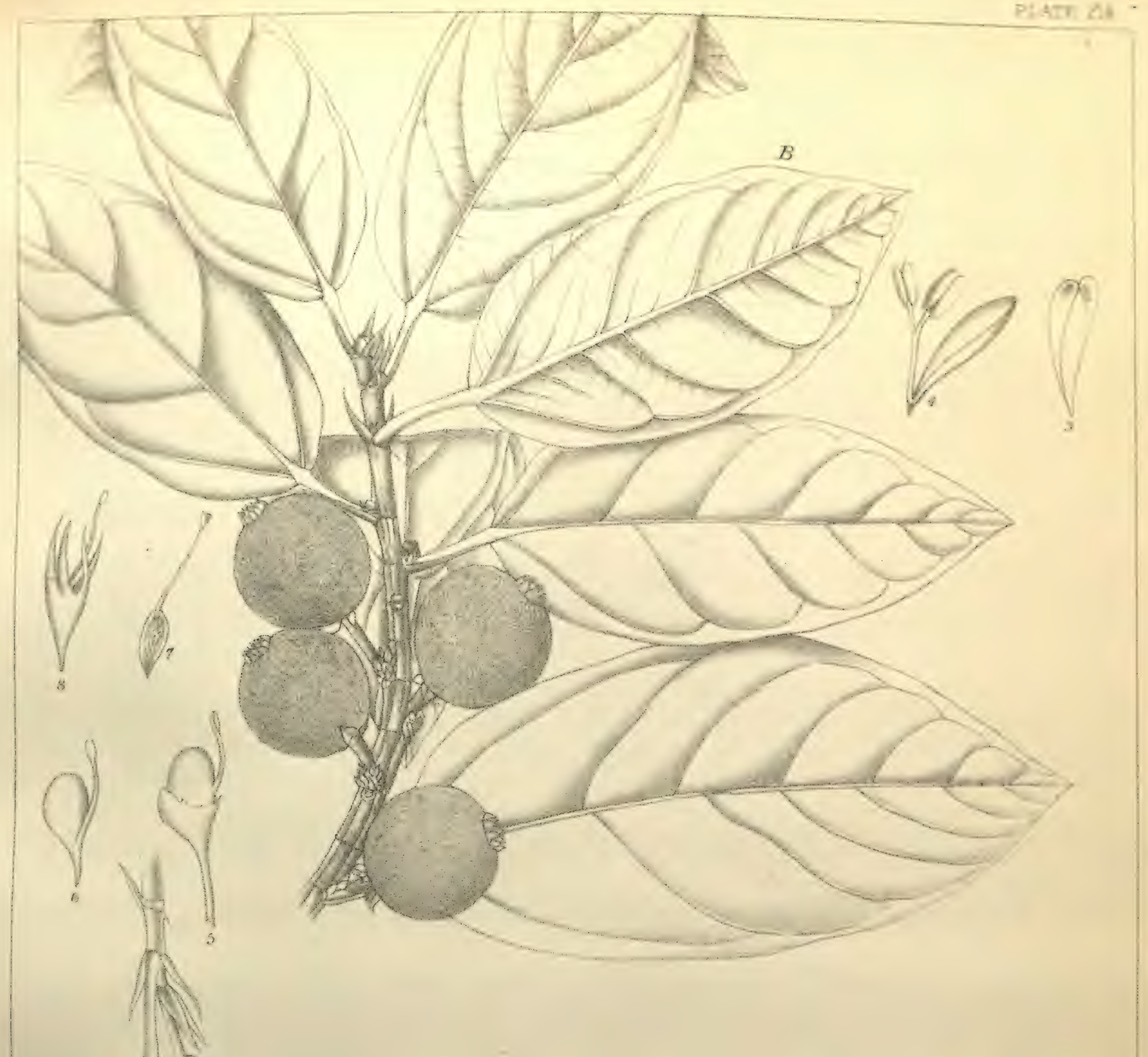
FICUS D'ALBERTISII, King.



Drawn by Aghore lal Singh, Bot. Garden Calcutta

Lith. and Printed by Kristohari Das.

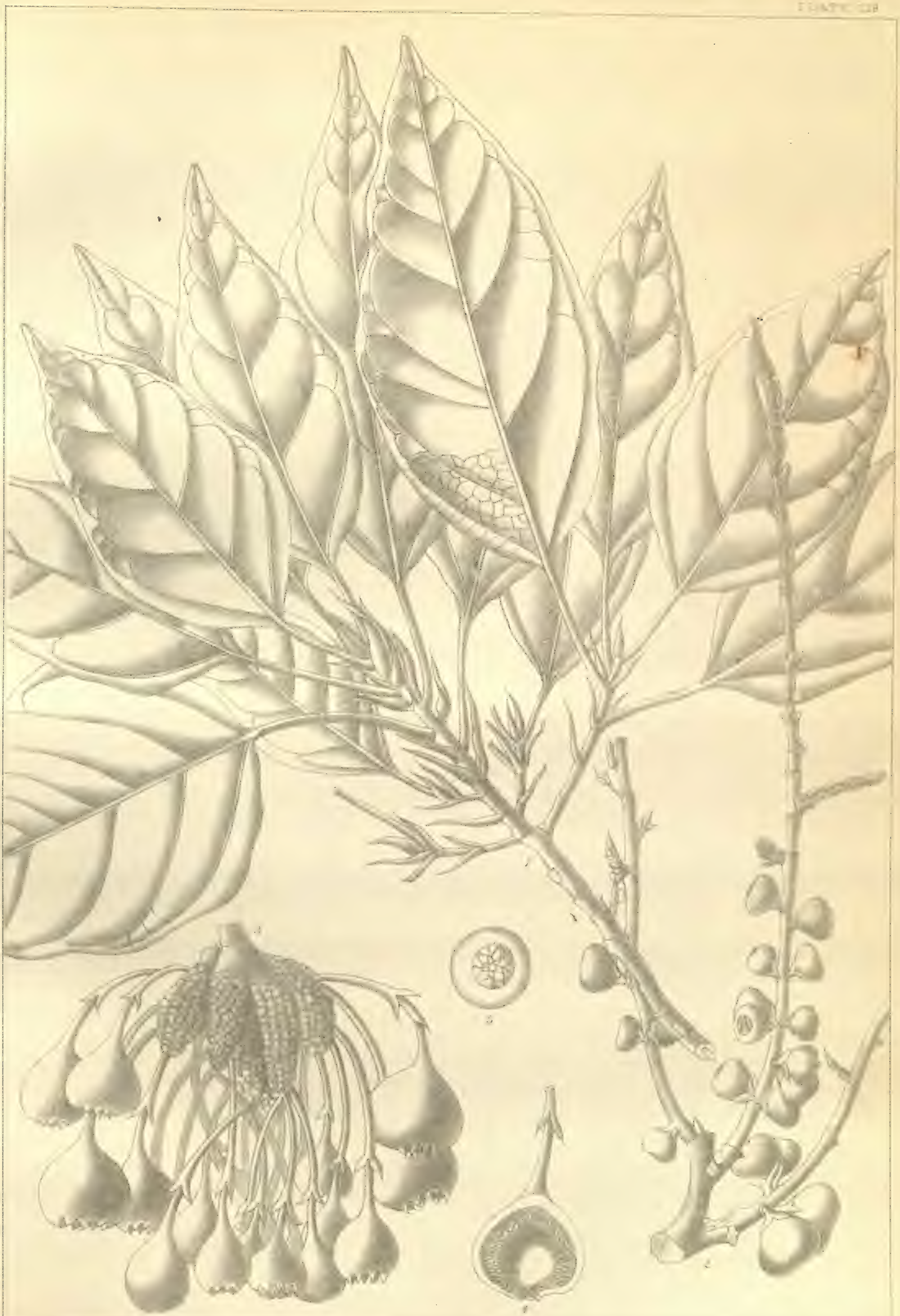
FICUS SYCOMOROIDES, Miq.



Drawn by Gopal Chunder Dass, Bot. Garden, Calcutta.

Lith. by J. C. Chuckerbutty, Govt. School of Art, Calcutta.

A. FICUS GLOMERATA, Roxb.
B Var. Miquelii.

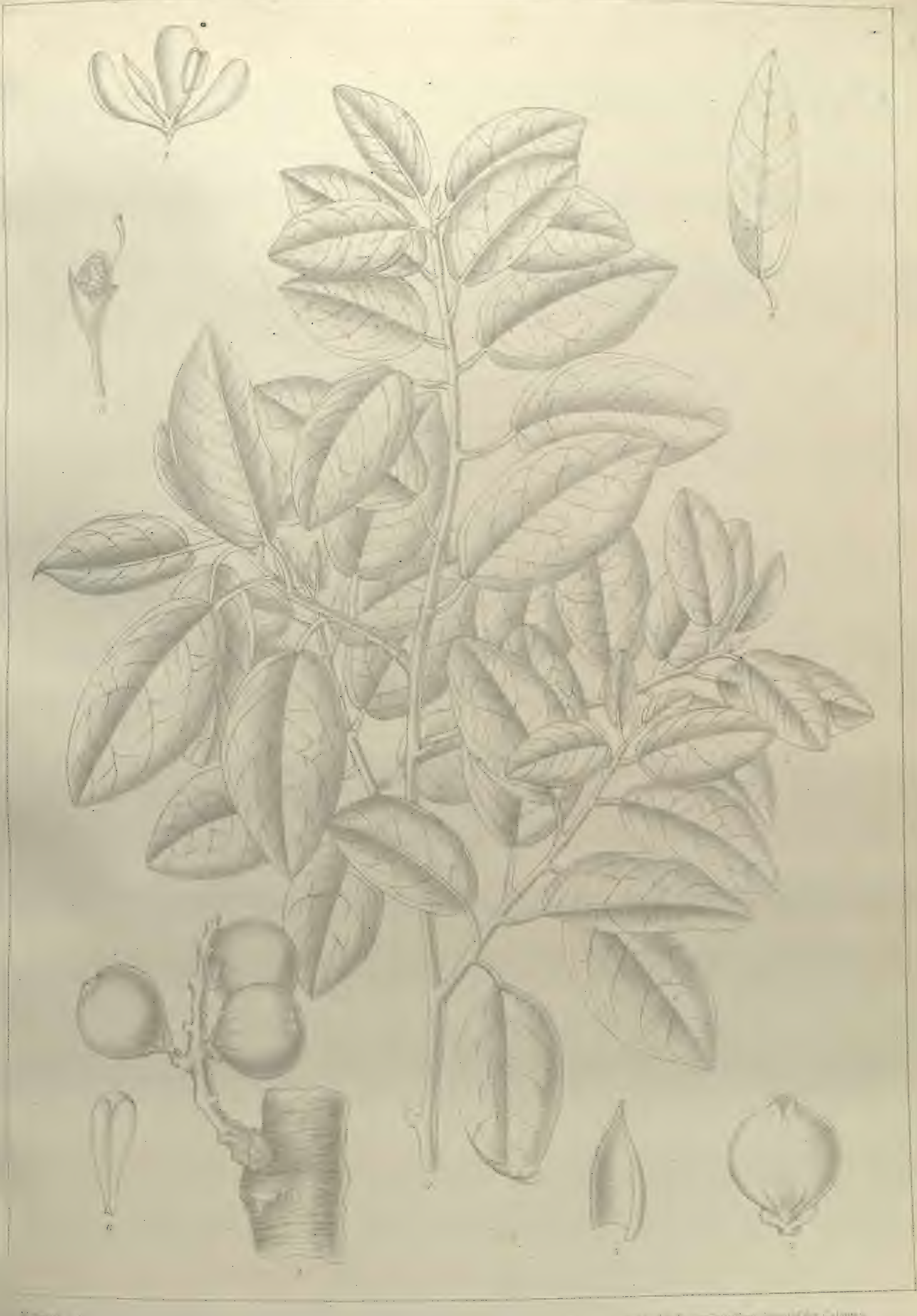


Drawn by Gopal Chunder Doss, Bot. Garden, Calcutta.

Lith. by J. C. Chuckerbutty, Govt. School of Art, Calcutta.

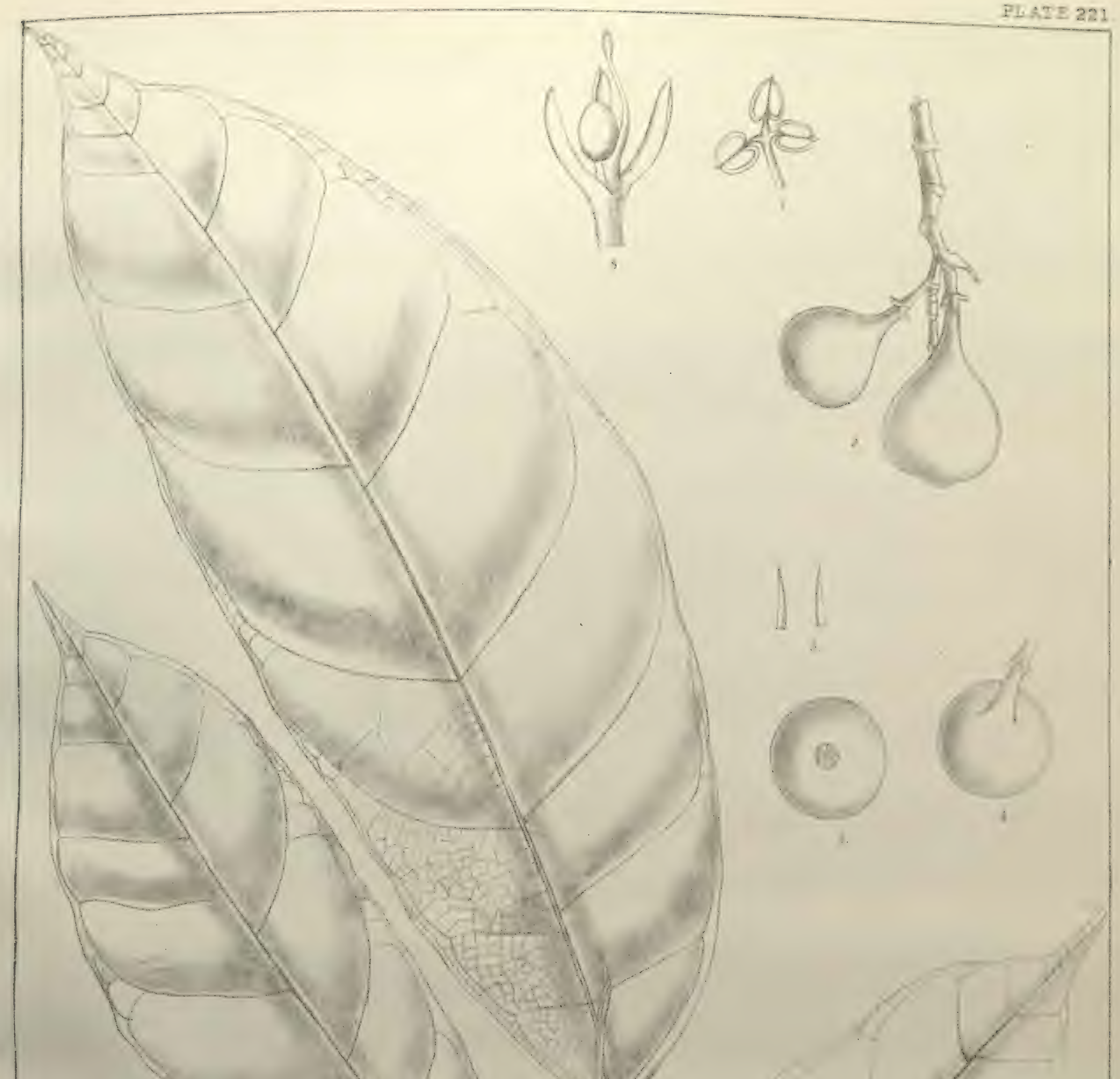
FICUS GLOMERATA, Roxb. Var. Chittagonga.

PLATE [illegible]



M. Smith, del. [illegible] Calcutta.

FICUS HENRYI, King.



Drawn by Aghore lal Singh, Bot. Garden Calcutta.

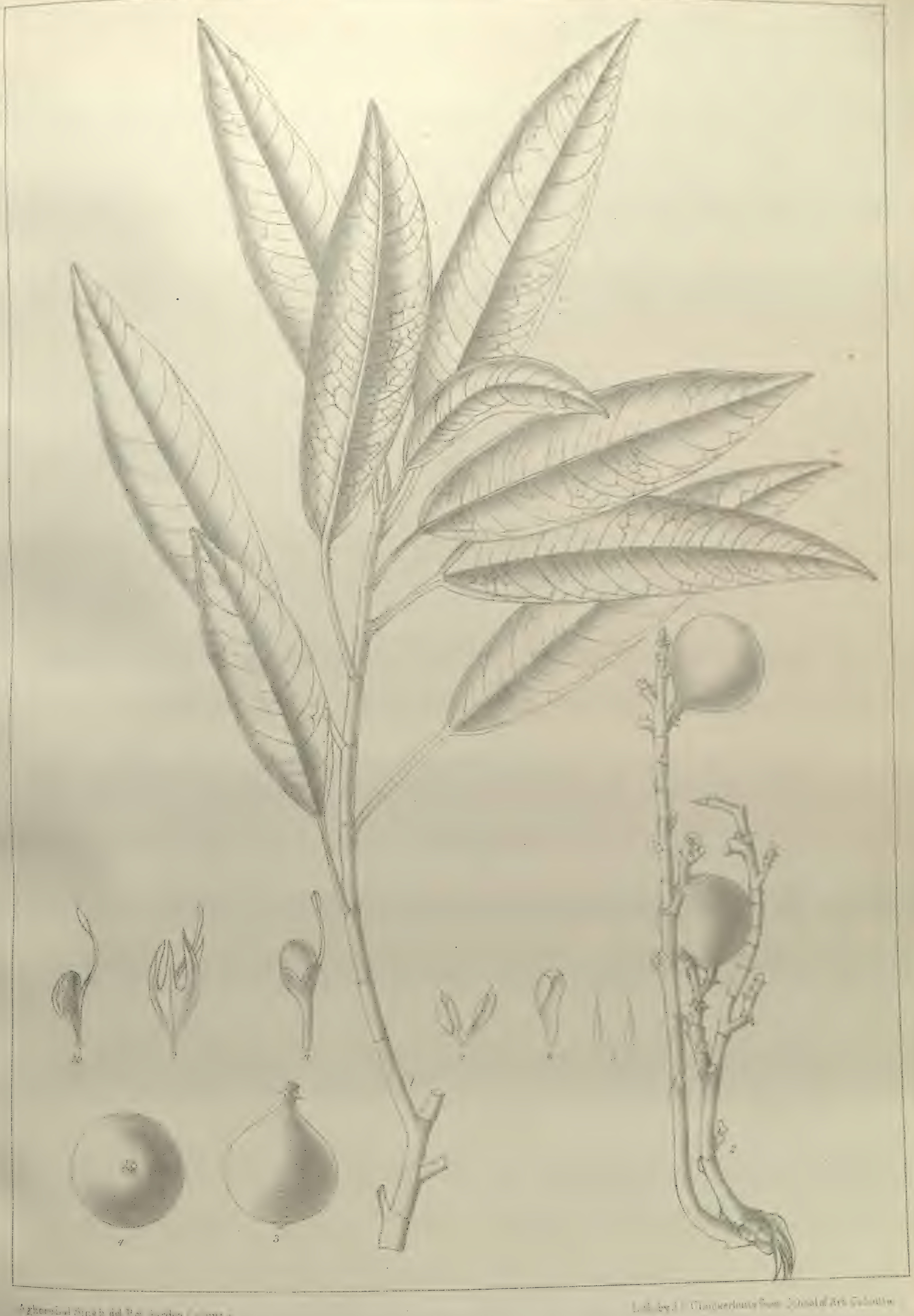
Lith: and Printed by Kristohari Das.

FICUS CLARKEI King.

M. Smith del.

[illegible]

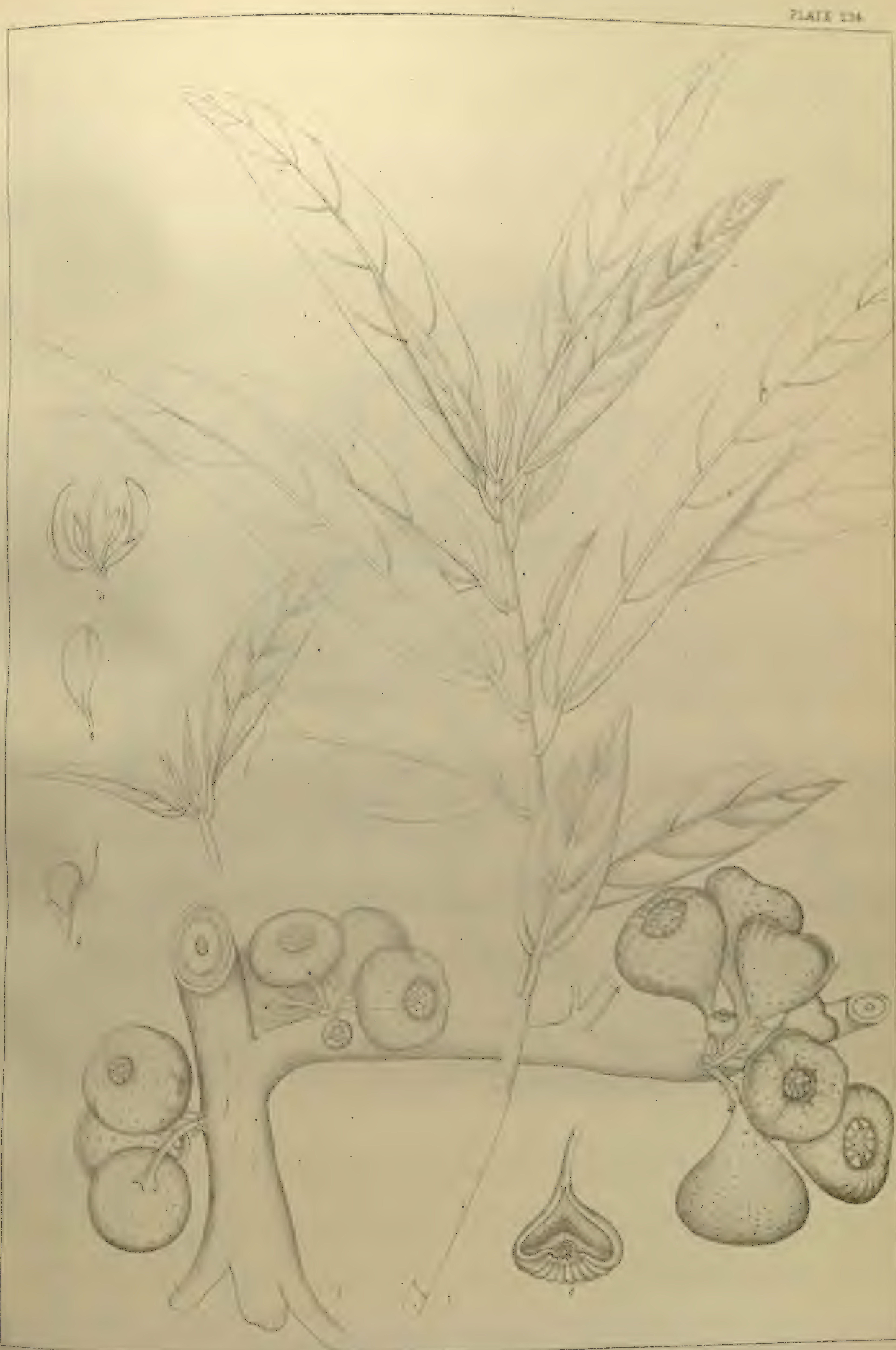
FICUS ARITENSIS, King.



Aghore Lal Singh del. Bot. Garden Calcutta.

Lith. by J. P. Chuckerbutty Govt. School of Art Calcutta.

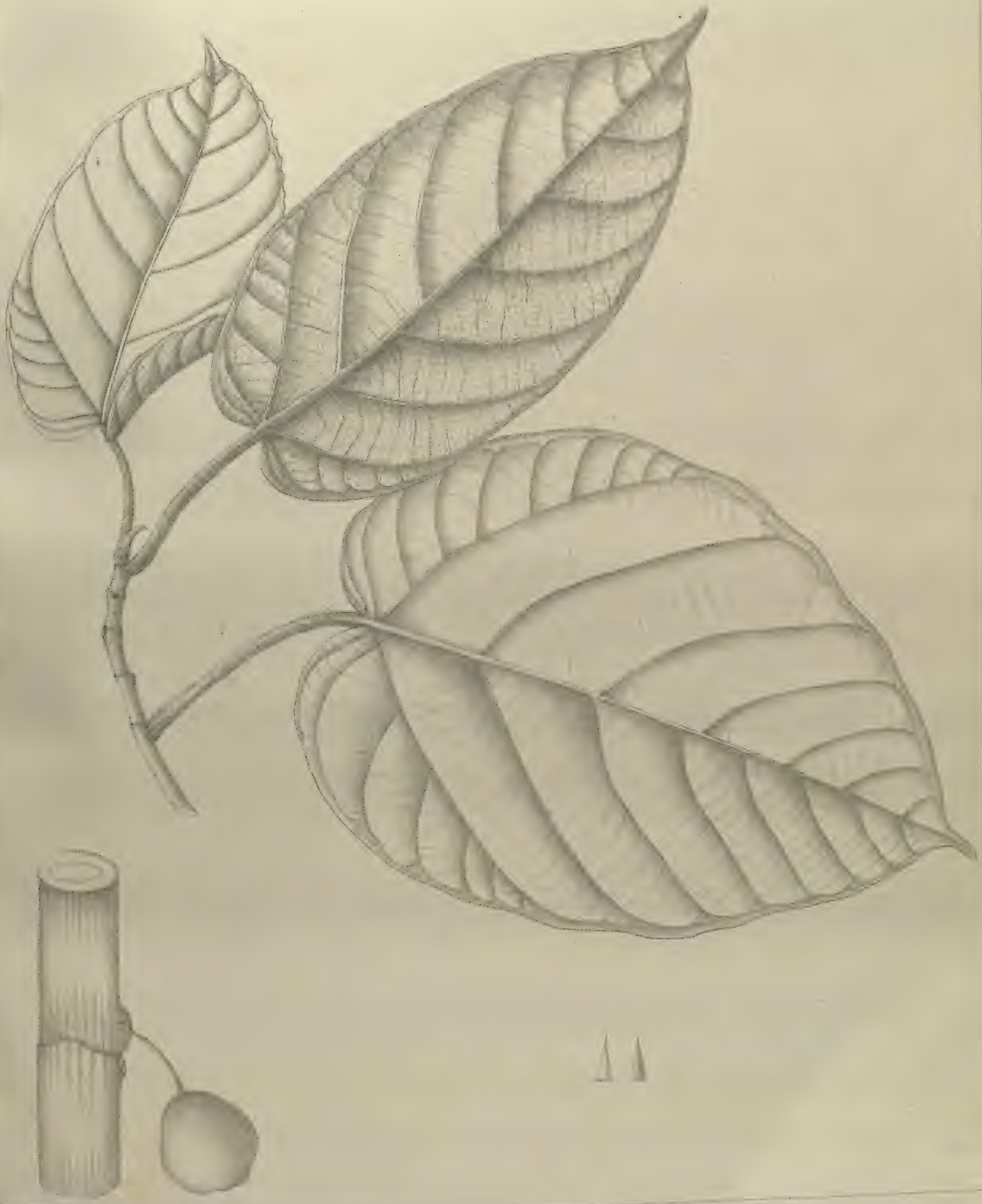
FICUS ACIDULA, King.



Drawn by Gopal Chunder Das. Bot. Garden Calcutta

Lith. and Printed by Kristohari Das.

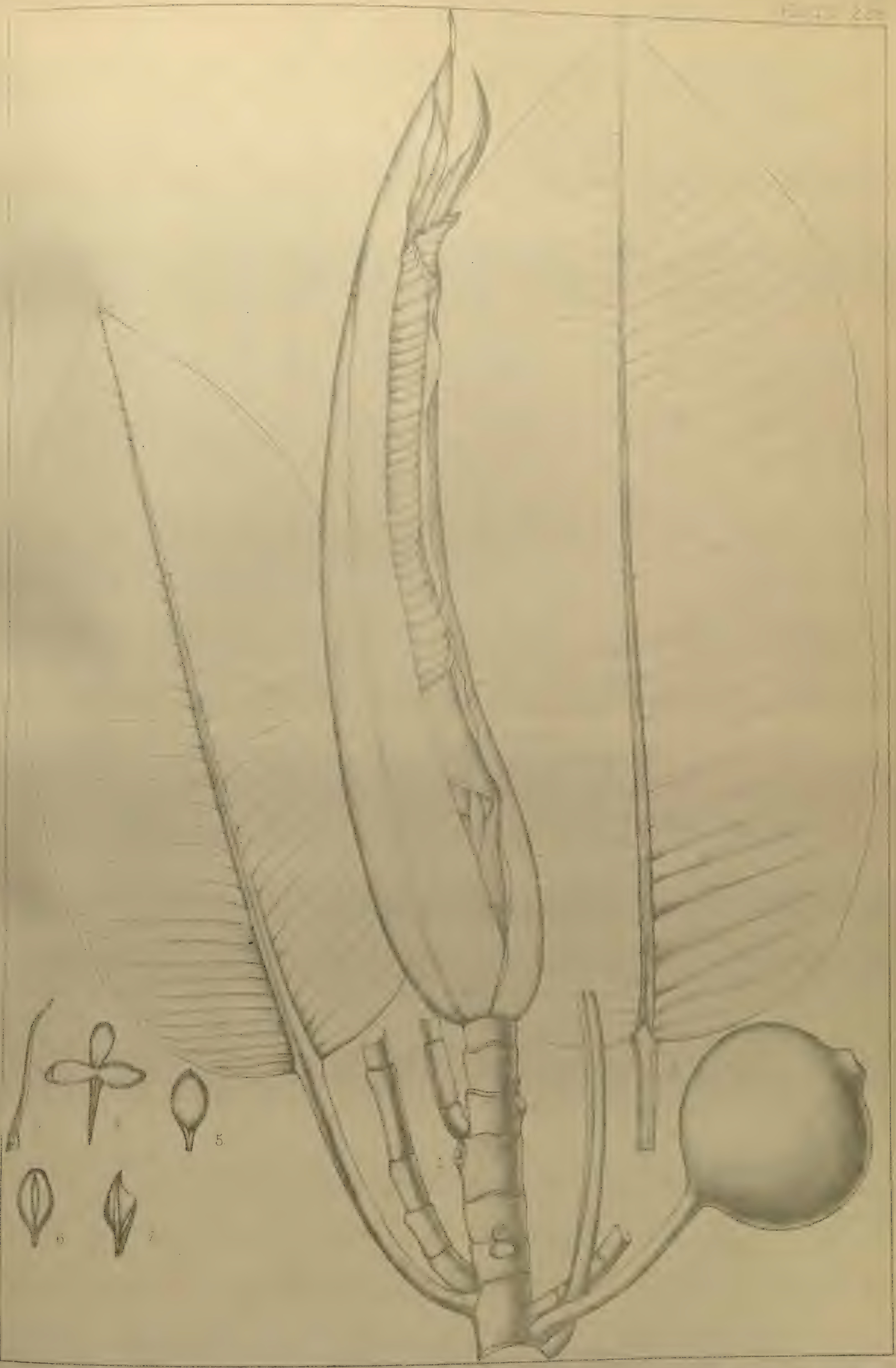
FICUS LANCEOLATA, Ham.



G. Das del. Roy. Bot. Garden Calcutta.

Lith. by S. Banerjee, Govt. School of Art, Calcutta.

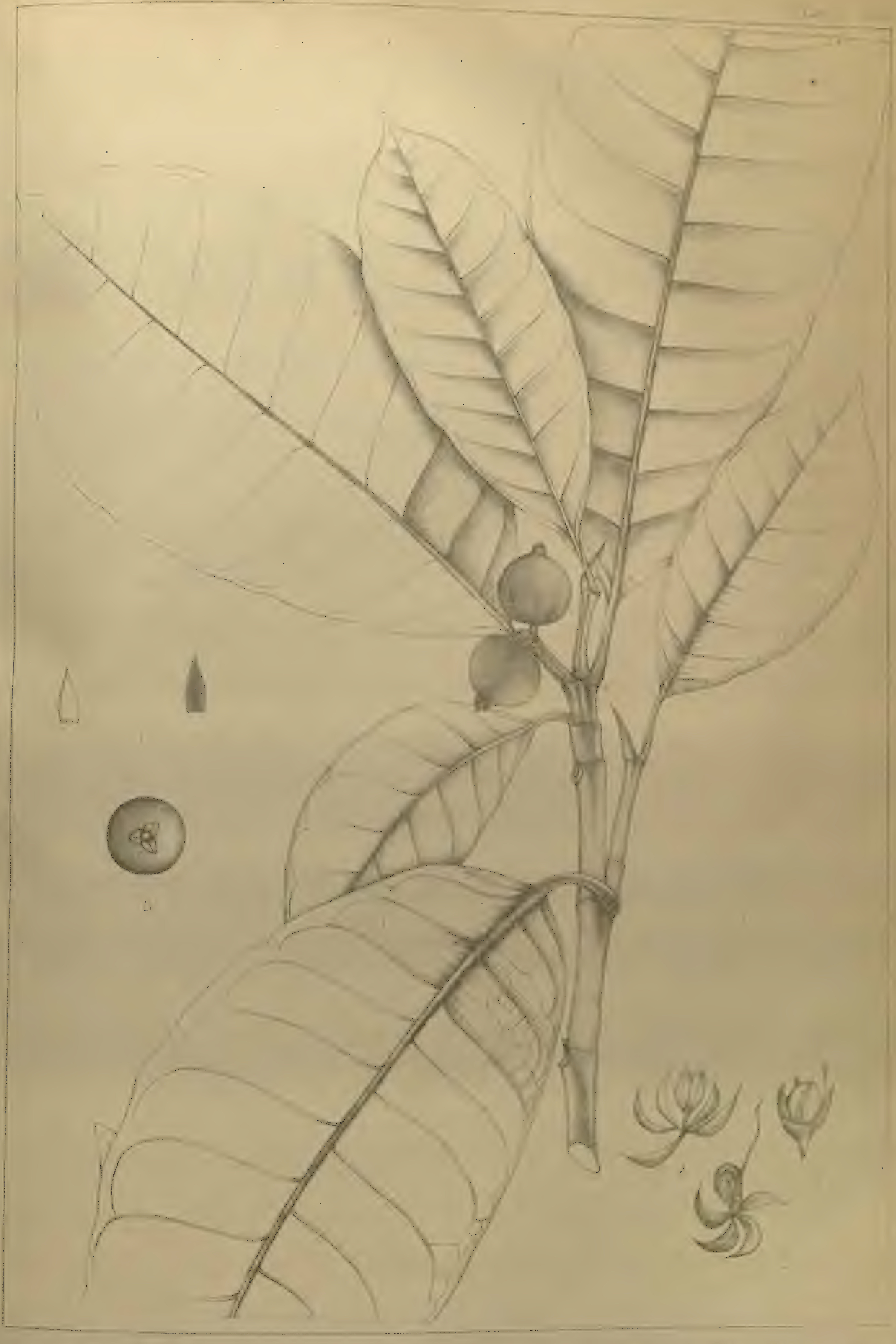
FICUS CORDIFOLIA, Blume.



G. C. Das del. Roy. Bot. Garden Calcutta

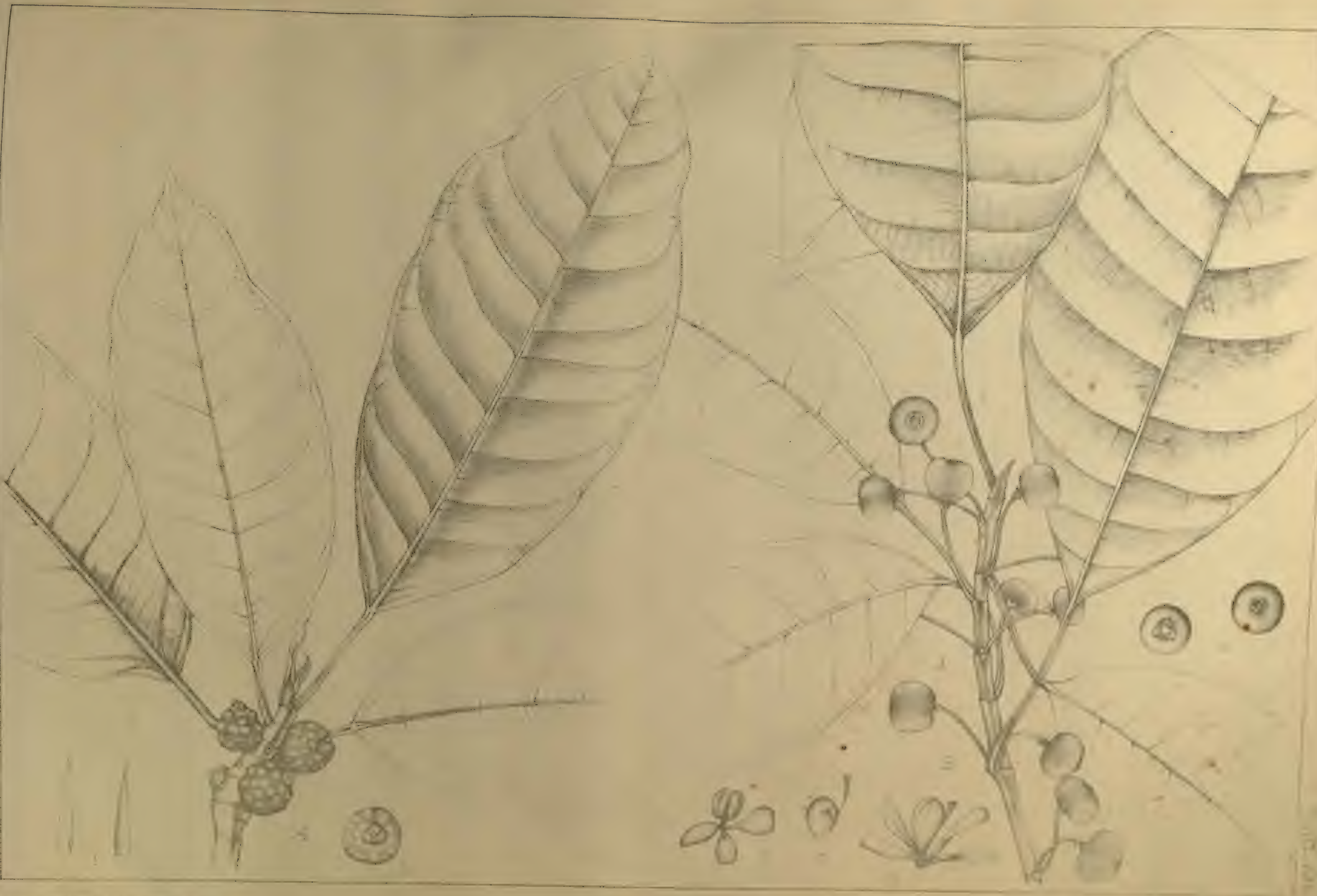
Lith. and Printed by [illegible] Lit.

FICUS HESPERIDIIFORMIS, King.



[illegible] del. Bot. Garden, Calcutta. [illegible]

FICUS [illegible]



A. L. Singh del. Bot. Garden Calcutta.

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FICUS LAWESII, *King.*

FICUS CASEARIOIDES, *King.*

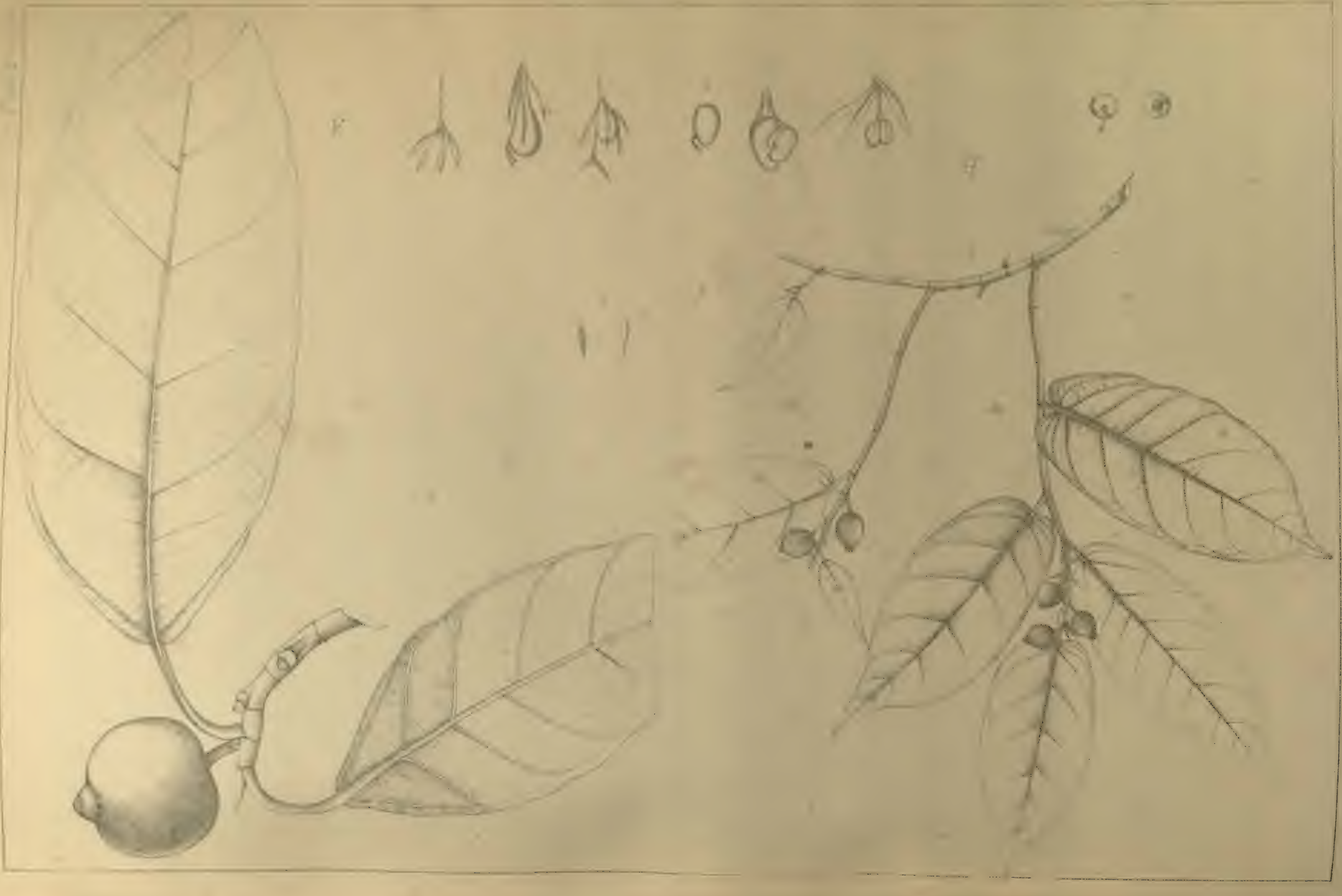
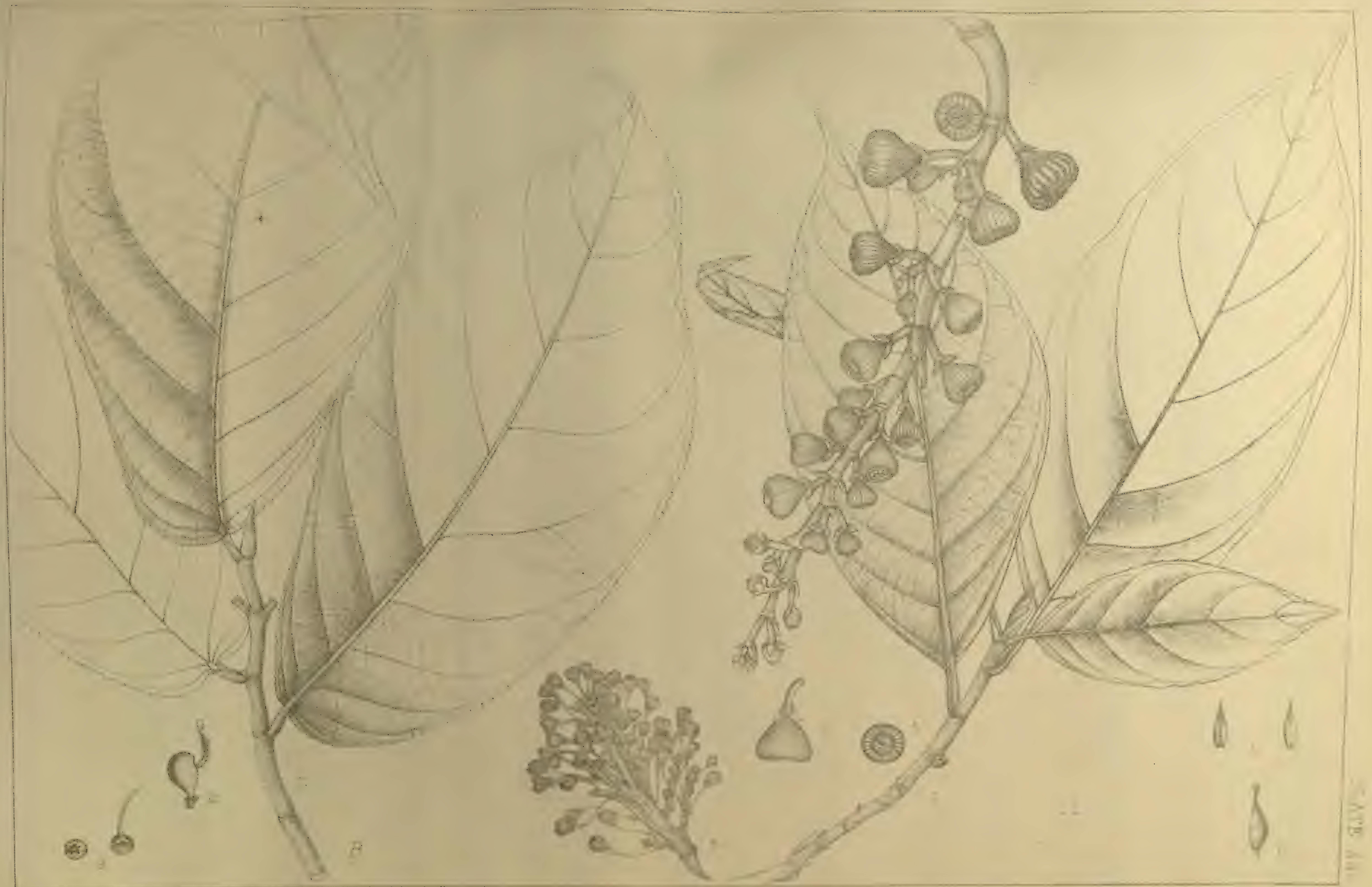


PLATE 44.



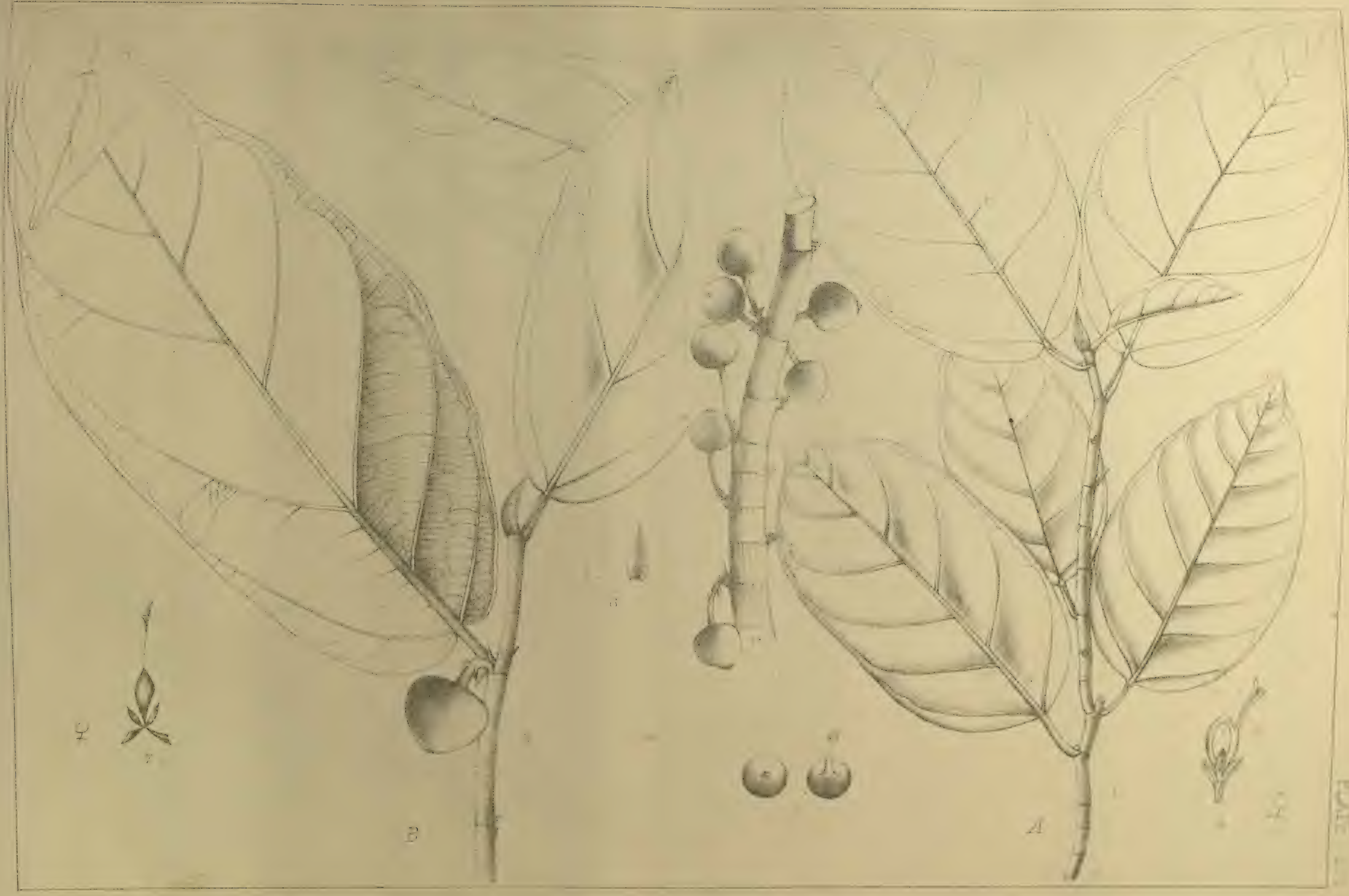
J. C. Das del. Bot. Garden, Calcutta

Lith. and Printed by W. Newman & Co.

FICUS BERNAYSII, King

FICUS CHALMERSII, King

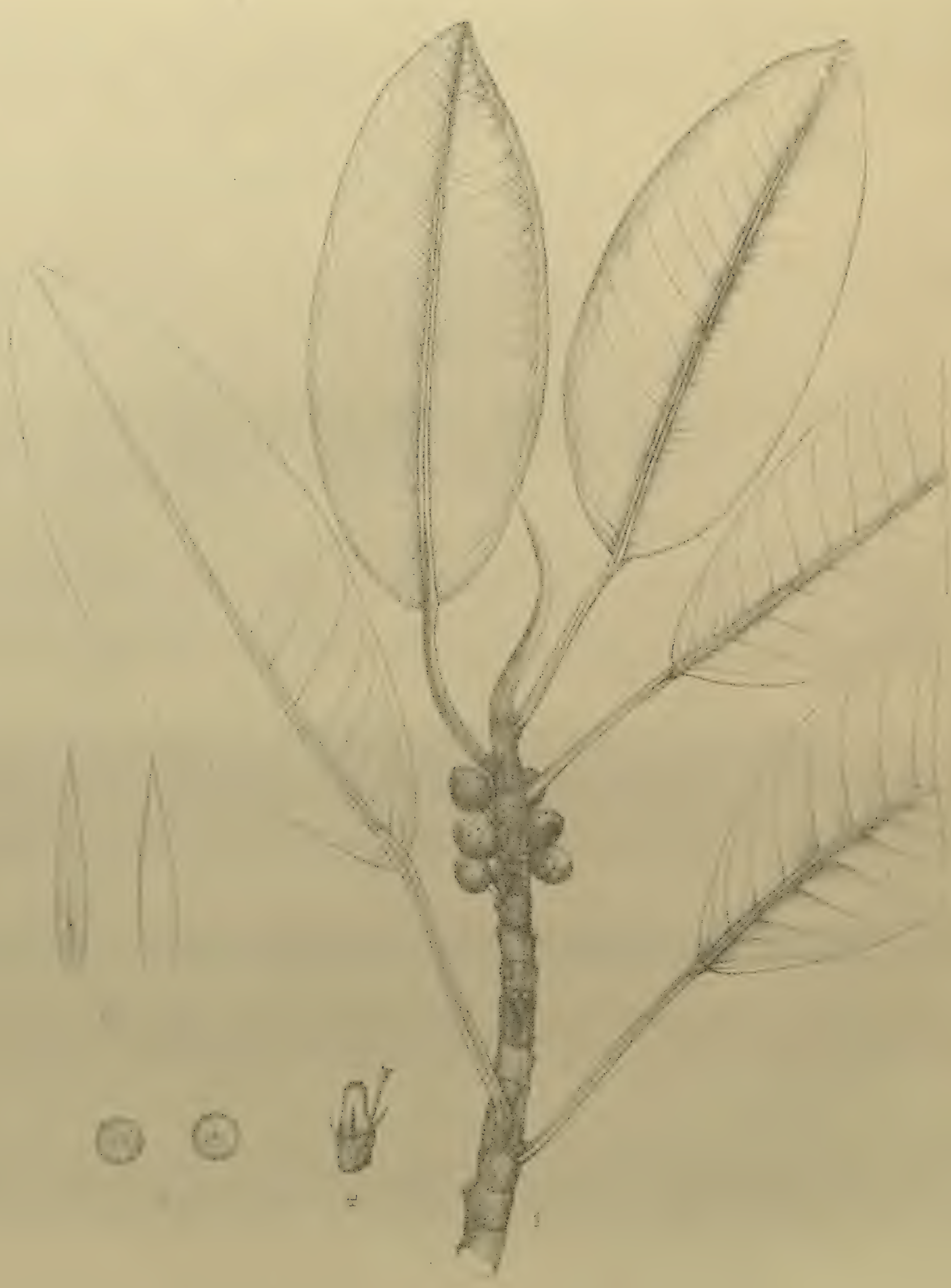
PLATE



G. D. Das del. et lith. [illegible]

FICUS BABURSENI, King [illegible]

[illegible]



[illegible] Das del. [illegible] Calcutta

Lith. and Printed by Kristo [illegible] Das

FICUS RHIZOPHORAEPHYLLA, King

ANNALS

OF THE

ROYAL BOTANIC GARDEN, CALCUTTA.

Vol. I.

MISSOURI
BOTANICAL
GARDEN

APPENDIX.

SOME

NEW SPECIES OF FICUS

FROM NEW GUINEA.

BY

GEORGE KING, M.B., LL.D., F.R.S., F.L.S.,
Superintendent, Royal Botanic Garden,
CALCUTTA.

Urostigma.

FICUS HESPERIDIIFORMIS, *King in Journ. As. Soc. Bengal* lv. *pt.* ii. 401.

A tree; glabrous in all parts except the stipules, which are minutely tomentose externally; young branches hollow, thick, marked with annular scars. Leaves coriaceous, alternate, broadly elliptic-oblong, gradually tapering towards the apex, which ends in a short rather blunt point; the base rounded, edges entire; lateral primary nerves very numerous (40 or 50 pairs), running nearly at right angles from the thick prominent midrib and anastomosing about ·1 in. from the edge; secondary nerves and reticulations minute but distinct; the petiole from $\frac{1}{3}$ to $\frac{1}{2}$ as long as the blade; stipules very large, coloured, convolute, minutely tomentose on the outer, smooth on the inner surface; length of blade and of stipules 6 to 9 in.; petioles 2·5 in. to 4·5 in. Receptacles large, axillary, solitary, pedunculate, globose, smooth, apparently without basal bracts, about 1·5 in. in diam., the walls very thick. Male flowers numerous, pedicellate; anther single, sub-sessile, ovoid, its walls thick and cartilaginous, the dehiscence lateral; perianth gamophyllous with 3 oblong blunt segments. Gall-flowers with hard, crustaceous, 3-sided ovary, thick short pedicel, and no perianth other than the long, linear, subulate scales which spring from the walls of the receptacle between the flowers. Fertile female flowers not seen.

New Guinea,—*H. O. Forbes*, No. 737.

The material in my possession is not very abundant, and I have not had the advantage of seeing Mr. Forbes's field notes. I presume this is a tree. The leaves and stipules at once recall to mind those of *F. elastica*. But the leaves of this are larger, and the stipules are tomentose externally. The receptacles are quite different from those of *elastica*, being greatly larger and of a globular, not an ovoid, shape. When dry, the receptacles a good deal resemble small oranges.

Plate 226.—*F. hesperidiiformis*, King. 1, branch with young leaves and mature receptacle; 2, fully-grown leaf—*of natural size;* 3, scale from inner wall of receptacle; 4, male perianth; 5, anther; 6, the same opened; 7, gall-flower: *enlarged.*

Ficus Edelfeltii, *King in Journ. As. Soc. Bengal* lv. *pt.* ii. 402.

A tree; the bark of the young shoots pale and slightly puberulous; all the other parts glabrous except the midribs of the leaves and the receptacles. Leaves alternate, thinly coriaceous, shortly petiolate, from oblong to obovate-elliptic, gradually narrowed to the rounded 5-nerved base; the apex rather suddenly contracted to a short blunt acumen; the edges entire and slightly undulate; primary lateral nerves about 9 pairs, prominent on the lower surface and forming bold intramarginal arches; the midrib prominent, sparsely adpressed-pubescent; the rest of the lower surface glabrous and shining; the minor nerves and reticulations strongly marked; upper surface dull, darker than the lower; length of blade 6 to 8 in.; width 3 to 3·25 in.; petioles ·5 in. long; stipules slightly shorter than the petiole, lanceolate, convolute. Receptacles axillary, in pairs, pedunculate, globular, with a projecting cylindric pubescent umbilicus; the sides pubescent when young, nearly glabrous when adult, from ·6 in. to ·75 in. in diam.; basal bracts 3, small, reflexed; peduncle about ·1 in. long, tomentose. Male flowers only near the mouth of the receptacle, sessile; the stamen elliptic, on a short thick filament; perianth of 5 narrowly semi-lunar pieces. Gall-flowers with a globular smooth, thin, naked ovary and a short lateral style; the perianth like that of the male. Fertile female flower with an ovoid, rather flattened, minutely tuberculate achene, and a filiform lateral style much longer than the ovary; the stigma triangular; perianth of 4 broadly semi-lunar pieces.

New Guinea,—*H. O. Forbes*, No. 59, and probably also 409, of which I have not complete specimens.

In foliage this species much resembles the Indian *F. nervosa*, Heyne; but the receptacles of this are much larger. Its nearest ally is, however, *F. pubinervis*, var. *Teysmanni*, which it almost exactly resembles in the form, texture, and nervation of its leaves. The flowers, however, of the two differ, and I have no doubt they are distinct species.

Plate 227.—*F. Edelfeltii*, King. Fruiting-branch. 1, stipules; 2, base of receptacle—*of natural size;* 3, male flower; 4, gall-flower; 5, fertile female flower: *enlarged.*

Ficus Lawesii, *King in Journ. As. Soc. Bengal* lv. *pt.* ii. 403.

A tree; all its parts quite glabrous; the bark of the young shoots pale and shining. Leaves petiolate, thickly membranous, ovate-oblong or narrowly elliptic, entire; the base rounded, 3-nerved; the apex gradually narrowed to a very short blunt point; lateral primary nerves diverging from the bold midrib at a wide angle, about 10 pairs, not very prominent on either surface; the reticulations small and rather distinct on the lower surface; both surfaces quite smooth, but rather dull when dry; length of blade 5 to 6 in.; width 2·5 in.; petiole 1 in. to 1·25 in.; stipules narrowly lanceolate, convolute, rather more than half as long as the petiole. Receptacles crowded near the ends of the branches, in pairs, sessile, cylindrico-globose, ·5 in. in diam., contracted at the base into a short thick pseudo-stalk; umbilicus composed of 3 large, thick, smooth triangular scales, the sides smooth; basal bracts coalescing into an irregular ring. Gall-flowers sessile; the ovary prismatic, conical, smooth; style and stigma absent. Male and fertile female flowers unknown.

New Guinea,—*H. O. Forbes*, No. 85.

From its general *facies*, I have no doubt that this is a *Urostigma* near *nervosa*. The receptacles, however, in the only two specimens I have seen are diseased, and only the gall-flowers can be distinguished.

I have named this after the Rev. W. G. Lawes, one of the devoted band of missionaries settled on the south-eastern coast of New Guinea who have done so much in the way of collecting.

PLATE 228A.—*F. Lawesii*, King. Fruiting-branch. 1, stipules; 2, apex of receptacle—*all of natural size.*

FICUS CASEARIOIDES, *King in Journ. As. Soc. Bengal* lv. *pt.* ii. 403.

A glabrous tree. The leaves on long petioles, thinly coriaceous, alternate, entire, broadly ovate-elliptic, tapering much to either end; the base acute, 3-nerved; the apex suddenly and shortly triangular-acuminate; lateral primary nerves 8 to 10 pairs, nearly at right angles to the midrib and, like it, strongly marked on the under surface, which is minutely tuberculate-tesselate; length of blade 5 to 6·5 in.; breadth 2·75 in. to 3·25 in.; petiole 1·5 in.; stipules lanceolate sub-convolute, ·6 in. long. Receptacles axillary, in pairs, on long slender peduncles, ·5 in. in diam., depressed globular with a slight stalk-like constriction at the base, smooth; basal bracts 3, minute; peduncles ·75 in. long. Male flowers sessile; the single anther broadly ovate, sub-sessile; the perianth of 3 obovate pieces. Gall-flowers sub-sessile or pedicellate; the ovary smooth, with thick crustaceous walls; the style short, lateral; the stigma infundibuliform; perianth of 4 or 5 oblong pieces which closely invest the ovary. Female flowers like the galls, but with a shorter, more globose, ovary and a longer style: all three kinds in the same receptacle.

New Guinea,—*H. O. Forbes*, No. 568.

The leaves of this a good deal resemble those of *F. casearia*, Mull., but the structure of the flowers is different. The affinities of this in the section *Urostigma* are with *nervosa*.

PLATE 228B.—*F. casearioides*, King. 3, fruiting-branch; 4, base and apex of receptacle—*of natural size*; 5, male flower; 6, gall-flower; 7, fertile female achene *enlarged.*

Synoecia.

FICUS SCRATCHLEYANA, *King in Journ. As. Soc. Bengal* lv. *pt.* ii. 404.

Scandent, glabrous except the receptacles which are minutely sub-tomentose. Leaves petiolate, coriaceous, entire, narrowly elliptic-oblong, gradually tapering to either end; the base minutely cordate, 3-nerved; the apex with a short blunt point; under surface tesselate; primary lateral nerves 5 or 6 pairs, prominent beneath, as is the midrib; length of blade 5 to 7 in.; width 1·75 in. to 2·25 in.; petioles 1 in. to 1·5 in. long; stipules subulate, convolute, about ·5 in. long. Receptacles axillary, solitary, pedunculate, ovoid-globose, minutely sub-tomentose, with a prominent umbilicus, about 1 in. in diam.; basal bracts 3, small. Fertile female flowers pedicellate; the perianth of 4 linear pieces; ovary ovoid-elliptic; the style lateral; stigma large, bicrural when young, truncate when adult from the absorption of the arms. Neuter flowers mixed with the females all over the receptacle, pedicellate; the perianth of 4 lanceolate pieces. Receptacles containing male and gall-flowers not seen.

New Guinea,—*H. O. Forbes*, No. 900.

This is well distinct from any other species of this group. Its nearest ally is *F. apiocarpa*, Miq.

Plate 220A.—*F. Scratchleyana*, King. Fruiting-branch—*of natural size.* 1, young fertile female flower; 2, ripe achene of fertile female; 3, neuter flower: *enlarged.*

Sycidium.

Ficus Armiti, *King in Journ. As. Soc. Bengal* lv. *pt.* ii. 404.

A climber; the young shoots covered with short, buff-coloured tomentum. Leaves alternate, shortly petiolate, membranous, ovate-lanceolate, with a long acuminate apex; the base rounded or sub-cordate, 5 to 7-nerved; the edges entire; primary lateral nerves 5 to 7 pairs, diverging from the midrib at rather a wide angle; lower surface minutely tuberculate, hispid especially on the midrib and nerves, the longer hairs with black enlarged bases; upper surface scabrid, the midrib minutely hispid; length of blade 2·5 in. to 3 in.; breadth 1·25 in.; petioles ·2 in. long, tomentose; stipules, 2 to each leaf, subulate, rather longer than the petioles, tomentose at first, but ultimately glabrous. Receptacles axillary, solitary, pedunculate, sub-globular, with rather a prominent umbilicus, shortly hispid-tomentose when young, glabrescent when mature, ·2 in. to ·25 in. in diam.; basal bracts none, but a few irregular, broad, fleshy bracts along the sides; peduncles slender, about ·2 in. long, tomentose. Male flowers numerous near the mouth of the receptacle; the perianth of 3 lanceolate pieces; anther single, broadly ovate, on a long stout filament. Gall-flowers with a pedicellate gamophyllous perianth, which is deeply cleft into 4 linear curving lobes, which embrace the ovoid, smooth, shining ovary; style lateral, from near the apex of, and half as long as, the ovary; stigma infundibuliform. Female flowers unknown.

New Guinea,—*H. O. Forbes*, No. 609.

This species approaches *F. ampelas*, Burm., but its leaves are more inclined to be cordate at the base and acuminate at the apex, and they are less scabrous and more hairy on the under surface; while the receptacles are larger, more hairy when young, and on longer peduncles, than in that species.

I have named this after Mr. Armit, of the *Argus* Expedition for the exploration of New Guinea.

Plate 220B.—*F. Armiti*, King. 4, fruiting-branch; 5, stipules; 6, base and apex of receptacle—*of natural size*; 7, male flower; 8, perianth of gall-flower; 9, achene of same: *enlarged.*

Covellia.

Ficus Chalmersii, *King in Journ. As. Soc. Bengal* lv. *pt.* ii. 406.

A tree; the young shoots slightly swollen at the nodes; the bark dark brown with short, pale, adpressed-hispid hairs. Leaves alternate, thickly membranous, ovate-lanceolate to ovate-oblong, tapering gradually to the slightly unequal, bluntish or sub-acute, 3-nerved base, and to the sharply, but shortly acuminate, apex; the edges entire or obscurely and remotely sub-serrate; primary lateral nerves about 7 pairs, minutely adpressed-hispid on both surfaces; the remainder of the lower surface of the leaf glabrous, of the upper surface minutely adpressed hispid; length of blade 5 or 6 in.; petiole about ·5 in. long, adpressed-hispid; stipules, in pairs, lanceolate, glabrous except a few stiff hairs near the base externally, ·5 in. long. Receptacles on short woody racemes from the stem and larger branches, pedunculate, in pairs, when young broadly pyriform with concave apex and much depressed umbilicus, smooth, ·75 in. or upwards in diam.; basal bracts 3, broadly triangular, united into a cup; peduncle thick, about ·25 in. long. Female flowers (when young) narrowly ovoid elliptic; the style short, thick, terminal, with a dilated discoid tubular stigma; the perianth gamophyllous, half as long as the ovary and closely applied to it. Ripe female, male, and gall-flowers unknown.

New Guinea,—*H. O. Forbes*, No. 100.

A species near *F. brachiata*, King, but not so glabrous, and with its receptacles borne on much shorter branches than in that species. Named after the Rev. J. Chalmers, the intrepid missionary explorer of New Guinea.

PLATE 230A.—*F. Chalmersii*, King. 1, leaf twig; 2, fruiting-branch; 3, receptacle—*side view;* 4, apex of receptacle; 5, stipules—*of natural size;* 6, young male flower: *enlarged.*

FICUS BERNAYSII, *King in Journ. As. Soc. Bengal* lv. *pt.* ii. 406.

A tree? the young shoots fulvous-tomentose. Leaves alternate, shortly petiolate, membranous, inequilateral, obovate-elliptic, tapering gradually from above the middle to the bluntish, very unequal, obscurely 5-nerved base, and rather suddenly to the shortly acuminate apex; the edges minutely serrate; the whole of the under surface shortly fulvous-tomentose; primary lateral nerves 7 pairs; upper surface shortly adpressed-hispid, tomentose on the midrib and nerves; length of blade about 7 in.; petioles under ·5 in.; stipules tomentose externally, glabrous internally, convolute, ·5 in. long. Receptacles on long peduncles, in short crowded panicles, from the stem and larger branches, puberulous, sub-globose, about ·25 in. in diam., contracted at the very base into a short pseudo-stalk at the junction of which with the peduncle proper are 3 small triangular basal bracts; peduncle proper nearly ·5 in. long. Young female flowers with a flattish, ovoid, smooth ovary; the style nearly as long as the ovary, lateral, curved, hairy; the stigma cylindric; perianth gamophyllous, very short, covering only the stalk of the ovary. Ripe female, male, and gall-flowers unknown.

New Guinea,—*H. O. Forbes*, No. 625.

A species which, in the form and arrangement of its receptacles, resembles *F. condensa*, King, and in its leaves approaches *F. stipata*, King, *F. fasciculata*, King, and *F. Forbesii*, King.

Named in honour of Mr. L. Bernays, of Brisbane, whose efforts for the exploration of New Guinea and for the development of his own Colony of Queensland are so well known.

PLATE 230B.—*F. Bernaysii*, King. 7, leaf twig; 8, cluster of young receptacles; 9, base and apex of young receptacles—*of natural size;* 10, young female flower: *enlarged.*

Eusyce.

Ficus Pantoniana, *King in Journ. As. Soc. Bengal* lv. *pt.* ii. 407.

A glabrous climber. Leaves alternate, shortly petiolate, coriaceous, almost exactly oval or ovate-oblong, entire; the apex slightly acute; the base rounded or sub-cordate 3-nerved; primary lateral nerves 4 pairs, rather prominent on the lower surface, which has wide, obscurely tesselate reticulations; length of blade 3 or 4 in.; width 1·5 in. to 2 in.; petiole rather under ·5 in.; stipules ovate-acute, glabrous, ·3 in. long. Receptacles in pairs from the axils of the leaves, but mostly from the scars of fallen leaves, smooth, globular, ·4 in. in diam., produced at the base into a pseudo-stalk nearly ·5 in. long, at the junction of which with the peduncle proper are 3 minute bracts. Female flowers pedicellate; the perianth deeply 4-cleft, the lobes shorter than the ovate-oblong, smooth, pale-edged ovary; style thick, lateral; stigma widely infundibuliform. Male and gall-flowers not seen.

New Guinea,—*H. O. Forbes*, No. 185.

I have not seen the receptacles of this which contain the male and gall-flowers; but I put it into this section with some confidence from its resemblance, in externals as well as in the structure of the female flowers, to *F. disticha*, Bl.

I have named it in honour of Mr. J. A. Panton, a distinguished Australian explorer.

Plate 231A.—*F. Pantoniana*, King. 1, leaf twig; 2, piece of a fruiting-branch; 3, base and apex of receptacles—*of natural size;* 4, male flower: *enlarged.*

Ficus Baeuerleni, *King in Journ. As. Soc. Bengal* lv. *pt.* ii. 408.

Scandent; the young shoots puberulous. Leaves coriaceous, shortly petiolate, ovate-oblong or elliptic-lanceolate; the base rounded or subcordate 5-nerved (2 of the nerves minute); the apex gradually narrowed to a short point; the edges entire; primary lateral nerves 4 or 5 pairs, very bold (as is the midrib) on the under surface which is uniformly covered with very short, soft, brown tomentum; upper surface minutely tuberculate; length of blade about 7 in.; petiole ·4 in.; stipules convolute, pilose externally, rather longer than the petioles. Receptacles axillary, pedunculate, solitary or in pairs, depressed-globose, nearly 1 in. in diam., contracted at the base into a short pseudo-stalk at the junction of which with the peduncle proper are 3 broadly triangular basal bracts; peduncle proper ·25 in. long, tomentose. Female flowers with a perianth of 4 distinct fleshy pieces, which are shorter than the narrowly ovoid, smooth ovary; style slender, terminal; stigma halbert-shaped. Male and gall-flowers not seen.

New Guinea,—*H. O. Forbes*, No. 378.

This has a general resemblance to *F. recurva*, Bl. in the form and venation of its leaves and in the perianth of the female flowers. It is, however, well distinct by the larger size of all its parts, but especially of its receptacles which are ten times as large as those of *recurva*, besides being pedunculate and of a different shape. This also resembles *lasiocarpa*, Miq.

I have named this after M. Baeuerlen, of the expedition sent by the Geographic Society of Australasia for the exploration of New Guinea.

Plate 231B.—*F. Baeuerleni*, King. 5, fruiting-branch; 6, stipules—*of natural size;* 7, young male flower: *enlarged.*

FICUS RHIZOPHORÆPHYLLA, *King in Journ. As. Soc. Bengal* lv. *pt.* ii. 410.

Scandent; all parts glabrous. The leaves thinly coriaceous, on long petioles, narrowly elliptic, tapering equally to either end; the edges entire, cartilaginous, and slightly recurved when dry; the midrib keeled, and very prominent on the under surface; primary lateral nerves 12 pairs or upwards, sub-horizontal, scarcely visible on either surface; under surface minutely tesselate, dull; upper surface very smooth, shining; length of blade 3·5 in.; breadth 1·5 in.; petiole 1·3 to 1·8 in. long; stipules linear-lanceolate, glabrous, as long as, or longer than, the petioles. Receptacles crowded near the apices of the branches, in pairs, shortly pedicellate, globular, very minutely tuberculate, ·25 in. in diam. Female flowers on strong cartilaginous prismatic peduncles thicker than the prismatico-conical smooth ovaries; style from the base of the ovary which it slightly exceeds in length, straight, erect; perianth of 3 linear pieces which rise from the margin of the peduncle. Male and gall-flowers unknown.

New Guinea,—*H. O. Forbes*, No. 578.

Without having seen its male and gall-flowers, I put this species without hesitation into the section *Eusyce*, on account of its resemblance to *F. oleæfolia*, King, a species from Sumatra which has leaves very like this in texture and venation, but is smaller in all its parts, and especially in its stipules. A farther indication of affinity is found in the fact that the gall-flowers of *oleæfolia* and the fertile females of this species have similar prismatic ovaries. This in foliage also resembles the Australian *F. eugenioides*, Mull., which, however, has very different female flowers, and which moreover is monœcious and falls into the section *Urostigma*. The leaves of this are of a pale greenish yellow when dry; in shape and venation they much resemble those of *Rhizophora conjugata*, Linn.

PLATE 232.—*F. rhizophoræphylla*, King. 1, fruiting-branch; 2, stipules; 3, base and apex of receptacles—*of natural size;* 4, fertile female flower: *enlarged.*

INTRODUCTION

TO

Dr. CUNNINGHAM'S MEMOIR.

It has been assumed in the following paper that the nature and arrangement of the flowers in the receptacles of diœcious species of figs are familiar to the reader; but in case they may not be so, it may be well to give a brief description of them. The receptacles consist of hollow, flask-shaped or spheroidal bodies, the cavities of which are bounded by solid walls save at their apparent apices, where these are replaced by masses of the appressed and interlocking bracts of the so-called ostioles. In *F. Roxburghii* and many other species the arrangement of these bracts is such as practically to convert the interior of the receptacle into a closed cavity. In this species two distinct kinds of receptacles are to be met with, each kind being confined to particular trees. In one of these two forms of flowers are present, viz. (*a*) true male flowers situated in the neighbourhood of the ostiole and capable of producing pollen, and (*b*) modified female or gall-flowers, which never produce seed, but within the ovaries of which in very many cases the ova of certain species of insects are deposited and undergo evolution. In the second kind of receptacles no male flowers are present, and the floral surface of the cavity is occupied by true female flowers, which never contain the ova or embryos of insects, but which are capable of producing fertile seeds. The perfect evolution of both male and true female flowers in *Ficus Roxburghii*, and probably in other species also, is dependent on the access of the fig-insects to interior of the receptacular cavity. Should access fail to occur, both forms of flowers abort without the formation of pollen-grains in the one case or seeds in the other, and the access of the insects is thus as necessary for the perfect evolution of the normal male and female flowers as it is for that of the modified female or gall-flowers with their contained ova and insect-embryos.

ON THE

PHENOMENA OF FERTILIZATION

IN

FICUS ROXBURGHII, WALL.

BY

D. D. CUNNINGHAM, M.B., F.L.S., &c.,

Surgeon-Major, Bengal Army.

Sources of materials.

THE trees from which specimens of receptacles were obtained were seven in number, five of which, including four males and one female, are in the Royal Botanic Garden, Calcutta; while the remaining two, one male and one female, are in the Zoological Garden, Alipore. In so far as the specimens in this region are concerned, the tree is strictly diœcious, one set of individuals invariably only producing receptacles containing gall-flowers and males, the other only producing receptacles containing true female flowers.

General phenomena of fruiting of Ficus Roxburghii.

As far as I have as yet been able to ascertain, two annual crops of receptacles, as a rule, come to maturity on the male trees. The precise period of maturation differs in different trees, but in all cases lies either in the cold weather or in the first half of the hot weather—that is, between the beginning of November and the middle of May. In two of the trees in the Botanic Garden maturation occurs in the end of November and the beginning of December, and again in February and March. In the other two maturation occurs somewhat later, apparently in December, and again in the end of April and early part of May. Hardly any new receptacles make their appearance during the hot weather—April to the middle of June—and these with any immature ones belonging to the cold weather appear, as a rule, to dry up and abort without having ever reached the stage at which the fig-insects, whose access is essential to true maturation, enter them. Some time after the onset of the rains in June new receptacles begin to appear again in numbers, representing the crops maturing in the early part of the cold weather. These statements must, however, be taken very generally, as great differences in regard to the numbers of receptacles developed at different periods appear to occur from year to year, and occasional buds may become developed at almost any time.

Much more definite data are available in regard to the duration of any crop which comes to maturity. The entire period from the first appearance of the buds of a crop of gall-receptacles to the escape of the fig-insects ranges between four and five months, varying somewhat according to the character of the season; two months intervening between their first appearance and the attainment of the stage of development rendering them suitable for the access of the insects, and two to three months from that time until full maturation takes place. Maturation proper is, however, dependent on the access of insects, and should this fail to take place, the receptacles dry and fall about a month after they were ready to be entered.

It is very difficult to determine the question of the number of annual crops of receptacles which mature on the female trees, as only a small number ever do mature even after they have been effectively visited by the fig-insects, due to the fact that in a large majority of cases they are attacked by the larva of some species of Lepidopterous insect, which, after spending the earlier portion of its existence in devouring the flowers, ultimately escapes by perforating the ostiole, and thereby causes escape of the receptacular fluid and consequent drying up and fall of the figs. In the case of the female tree in the Botanic Garden, from which alone normal ripe receptacles have been as yet obtained, there is only one site where they as a rule occur. This is at the very base of one of the stems, where the fertile twigs are actually on the ground and the receptacles are crowded together among the grass and weeds, which must apparently serve to protect them from the visits of the winged parents of the grubs. Here two, if not more, crops certainly mature in the course of the year—one in the end of February and March, the other in the latter half of May and beginning of June. The duration of any crop which successfully matures appears to be almost the same as in the case of the male receptacles, a period of from one to two months intervening between eruption of the buds and attainment of the stage for the access of insects, and two to three months between that and the occurrence of full maturation. For example, on the 10th of March 1888, the fertile twigs on the tree in the Botanic Garden were beginning to be covered with buds, some of them having already attained the size of hazel-nuts; on the 26th March some receptacles were ready for insects; on the 6th April some had already been entered; and on the 29th May ripe receptacles were present. The previous crop has a somewhat longer duration, no doubt due to the lower temperature to which it is exposed, and receptacles which are entered by insects in the end of November do not ripen until the end of February.

The eruption of new crops of receptacles sometimes occurs along with that of new leaves, but there is no necessary association of the two events. There are two periods of defoliation—the first and most complete fall taking place in the latter part of the cold weather in February, and a second one, which varies in degree with the nature of the season, occurring during the second half of the hot weather; the fall increasing in amount with the heat and dryness of the season. During the past season an eruption of a new crop of receptacular buds occurred simultaneously with the spring change of leaf on the female tree in the Botanic Garden, while none occurred at the same time on any of the male ones, in two of which at all events the previous crop of receptacles dated from the middle of the cold weather, when no change of leaf occurs.

The receptacles of Ficus Roxburghii.

In passing on to a description of the receptacles no mere general data are sufficient, and it is necessary to give details in regard to the condition of both female and male or gall-receptacles at different stages of development, and in relation to the fact of the fig-insects gaining access to them or failing to do so. We have thus to consider the features presented by each class of receptacles under the following headings:—

1. Characters at the stage when they are ready for the access of insects.
2. Characters of receptacles after insects have attained access, but before maturation.
3. Characters of mature receptacles to which insects have gained access.
4. Characters of mature receptacles to which insects have not gained access. Such receptacles are divisible into two varieties—
    - (*a*) One in which no appreciable development has occurred after the flowers have reached the condition which they normally present at the time for access of insects.
    - (*b*) One in which a certain amount of evolution of the male flowers or of some of the true female flowers has occurred beyond that condition.

I.—MALE OR GALL-RECEPTACLES.

A.—Characters at the stage when they are ready for the access of insects.

The following are the measurements obtained from a receptacle of average dimensions:—

External diameter	2″·0
Thickness of wall	0″·25
Thickness of plug of ostiolar bracts	0″·30
Diameter of area in centre of ostiolar aspect of cavity occupied by empty bracts	0″·49
Breadth of surrounding zone of male flowers	0″·21
Breadth of peripheral zone of gall-flowers on ostiolar aspect of receptacular cavity	0″·24
Depth of gall-flower stratum	0″·06

The ostiole is at this time closed by a firm, solid plug of closely-appressed ostiolar bracts, and the central area of the ostiolar aspect of the cavity is thickly clothed with others (Plate IV, figs. 21, 22). Around this bracteal area a narrow zone of true male flowers is situated, and external to it the continuous stratum of gall-flowers which lines all the rest of the receptacle commences (Plate IV, fig. 22). The area of bracts and male flowers forms a central concave boss on the ostiolar aspect of the cavity, the concavity mainly being due to the fact that the male flowers and their bracts stand erect, while the empty bracts are situated on an inclined basis, and become more and more oblique as they pass onwards along the course of the ostiolar channel, in the central portion of which they are arranged horizontally (Plate IV, figs. 21, 22, 23). In passing from without inwards along the course of the ostiolum, we first meet with bracts directed upwards and inwards in varying degrees of obliquity, next with horizontal ones, and then with a series which are directed downwards and inwards towards the cavity; the inclination becoming steeper and steeper internally until it becomes almost vertical at the internal limit of the zone of male flowers (Plate IV, fig. 21). The central bracteal area is of a pale yellowish-green colour, the zone of male flowers and their enclosing bracts is whitish, and the rest of the surface of a pale pink, or occasionally of a bright rose colour, due to the pigmented cells of the styles and stigmata of the gall-flowers. The cavity of the receptacle at this stage is devoid of fluid, the internal surface of the wall smooth and even, and the ovaries of the gall-flowers arranged in a single row, or at utmost in two rows, due to some of them being sessile and others shortly pedicellate (Plate IV, figs. 22, 25).

B.—Characters of gall-receptacles after access of insects, but before maturation.

The following data show the conditions present at various periods prior to maturation :—

1. Receptacle 16 days after access of insects to the cavity—

External diameter	2″·2
Thickness of wall	0″·24
Depth of gall-flower stratum	0″·19

The inner surface of the wall was no longer quite smooth, but had begun to show a series of elevations and depressions, and the ovaries of the gall flowers were already arranged in three or four superimposed strata. The cavity was still empty.

2. Receptacle to which insects had recently gained access—

External diameter	2″·5
Diameter of area of male flowers and ostiolar bracts	0″·91
Breadth of zone of male flowers	0″·18
Depth of ostiolar plug	0″·38
Depth of the solid portion beneath the level where the bracts were loosened, due to the corpses of insects interposed between them	0″·16
Average thickness of the walls	0″·39
Thickness of stratum of gall-flowers	0″·27

In this case the male flowers were present in three or four rows. They had emerged from their sheathing bracts, and the lobes of the outer perianth were beginning to separate. The inner surface of the stratum of gall-flowers was no longer composed of the stigmata, but of the summits of the projecting cupolas of the ovaries, and the cavity of the receptacle was full of fluid. The colour of the interior was faint madder-brown, due to the deeply tinted stigmata and slightly coloured ovaries.

3. Receptacle at a considerable period after the access of insects—

External diameter	3″·3
Diameter of area of ostiolar bracts in the cavity	0″·33 × 0″·58
Breadth of zone of male flowers	0″·3
Breadth of peripheral zone of gall-flowers on ostiolar face of the cavity	0″·54 to 0″·4
Thickness of wall of receptacle	0″·37
Depth of stratum of gall-flowers	0″·35

The peripheral area of gall-flowers around the zone of male flowers now projected above the level of the latter in place of forming a groove. The cavity was full of fluid.

4. Receptacle at a considerable period after the access of insects—

Diameter of area of ostiolar bracts	0″·35 x 0″·2
Breadth of zone of male flowers	0″·24
Breadth of peripheral prominent area of gall-flowers around the male flowers on the ostiolar face of the cavity	0″·47 to 0″·51
Thickness of receptacular wall	0″·37
Depth of stratum of gall-flowers	0″·3

The cavity was full of fluid and the internal surface of the wall uneven.

5. Receptacle almost mature; weight 387 grammes—

Depth of stratum of gall-flowers in some parts	0″·61

The cavity contained 20c.c. of a reddish-brown alkaline fluid full of fine, suspended particles, almost transparent when filtered, and with a specific gravity of 11163. The stratum of gall-flowers was very thick, and in some places contained 8 or 9 tiers of superimposed ovaries.

6. Receptacle almost mature—

Depth of ostiolar plug	0″·66
Diameter of area of male flowers occupying the centre of ostiolar face of the cavity	0″·84
Breadth of peripheral area of gall-flowers around the male flowers	0″·8
Thickness of the receptacular wall	0″·63

Cavity full of fluid. Ostiolar scales now all convergent, and no longer visible from the interior unless after pushing outwards the convergent flowers of the now centrally situated male area. Interior of the wall of the receptacle very uneven, being covered by a series of elevations and depressions (Plate IV, fig. 26).

C.—Characters of mature gall-receptacles to which insects have gained access.

The following are the data regarding a specimen in this condition:—

External diameter	3″·75
Diameter of prominent mass of male flowers in the centre of the ostiolar face of the cavity	0″·87
Diameter of ostiolar orifice internally	0″·4
Breadth of area around it occupied by bases of male flowers	0″·27
Thickness of ostiolar plug of bracts	0″·8
Breadth of peripheral area of ostiolar face of the cavity occupied by gall-flowers	0″·7 to 1″·16
Thickness of receptacular walls	0″·46 to 0″·58
Depth of stratum of gall-flowers	0″·5

The receptacular cavity was empty, and its walls very uneven. The male flowers had their stamens widely expanded, and formed a conspicuous rounded elevation on the centre of the ostiolar space. It was only on separating the central flowers that the ostiolar orifice became visible. It was firmly closed by ostiolar bracts, even the superficial of them being very obliquely inclined to one another, and the deeper ones lying horizontally.

On comparing the data regarding receptacles in various stages of maturation subsequent to the access of insects, it is very evident that, besides very great general increase in bulk (Plate I, figs. 1, 2), there is a distinct tendency towards an unfolding of the receptacle. The ostiolar orifice at the period of access of insects is normally more or less distinctly craterform, with the larger opening directed towards the cavity, and the sloping surfaces around it covered by somewhat oblique and almost erect bracts (Plate IV, fig. 21). In mature receptacles, on the other hand, the widest portion of the orifice lies externally, and the sides of the deeper portion, in place of being sloped, are almost vertical, the change in their inclination having necessarily induced one in that of the bracts springing from their surfaces (Plate I, fig. 2). The margins of the orifice are in fact turned outwards as maturation advances, the process causing a change in the direction of the bracts and increasing the depth of the plug. The main determinant of the change is the excessive growth of the gall-flowers in the peripheral area of the ostiolar aspect of the cavity, for, while the basal area of the male flowers remains almost unaltered, that of the gall-flowers is very greatly increased, and the accumulation of dense masses of enlarged ovaries in the deeper part of the concavity where the ostiolar and lateral faces of the receptacular cavity meet must evidently tend to force the former outwards, or, in other words, must tend to unfold the receptacle. The process causes little or no alteration in the dimensions of the internal orifice of the ostiolar channel, but tends to render the dimensions of the latter more or less uniform throughout. The concealment of the ostiolar bracts by the male flowers in the mature receptacles is thus not due to any appreciable extent to any contraction of the circular zone on which the latter are situated, but merely to change of direction in its contours in association with great growth in the individual flowers.

The increase in thickness of the stratum of gall-flowers is enormous. This is mainly due to the fact that the increase in bulk of the ovaries is altogether in excess of that of the surface to which the pedicels of the flowers are attached, the result being that it is no longer possible for them to find space arranged in a single or double layer as they originally were, and that they have to be packed away in many superimposed strata (Plate I, fig. 2; Plate IV, figs. 23, 26). Even this, however, would not give sufficient space were it not that the surface of attachment at the same time undergoes a relative increase, due to its no longer remaining smooth and even, but becoming covered by alternate elevations and drepressions. Until maturation approaches, the great growth in the peripheral gall-flower stratum of the ostiolar face of the cavity causes it to rise above the level of the central area occupied by the male flowers and ostiolar bracts, and to form an elevated ring around it, and it is only at a late period that a central eminence is again formed by the ultimate evolution of the male flowers (Plate I, fig. 2).

At the period of access of the insects the receptacular cavity is empty, but shortly after entrance has been effected fluid begins to make its appearance, and gradually accumulates until the cavity is entirely occupied; the accumulation becoming so considerable as to give rise to sufficient tension to cause a jet of fluid to escape on perforation of the receptacular wall. The fluid is of dark reddish-brown colour, and has an alkaline reaction and a specific gravity ranging from 1111 to 1116·3. On filtration it is almost transparent, but in its natural condition it is cloudy, due to the presence of minute reddish-brown particles. These particles appear to be due to macerative disintegration of the bracts and perianths of the flowers, and specially of the male flowers, and, due to the normally dependent position of the ostiolar aspect of the cavity, they are often deposited in large quantities over it, and give rise to very deep coloration there. As the stamens, however, are very late in emerging from within the closed hood of their inner perianth, only beginning to do so at the period at which absorption of the fluid occurs, they are, as a rule, unstained and of a brilliant white colour. The fluid abounds in filariæ, and also contains schizomycete elements and fungal cells, and sometimes various kinds of infusoria.

Just before final maturative changes set in—before the unfolding of the stamens and the escape of the insects from the ovaries are about to occur—the excessive flow of sap to the receptacles is arrested, and the fluid in the cavities is gradually absorbed and disappears. With this the consistence of the receptacles alters, and in place of being perfectly tense and hard, they yield somewhat on pressure. Their colour, too, changes from dark-green to reddish-yellow. The cavity is now once more empty, and its surfaces stained reddish-brown by the deposition of the particles and diffused colouring matter of the absorbed fluid. The colour varies in different parts from a very pale to almost black madder-brown, the depth of tint being determined by the greater or less dependence of the surface and its consequent liability to form a site of deposit. The deepest pigmentation, therefore, as a rule is around the male flower area, which now appears as a prominent eminence of crowded white filaments and anthers.

D.—Characters of mature gall-receptacles to which insects have not gained access.

The following data show the measurements obtained from four specimens:—

1.	External diameter	2″·0
	Diameter of area of ostiolar bracts and male flowers	0″·690
	Breadth of zone of male flowers	0″·17
	Thickness of receptacular wall	0″·28
	Depth of stratum of gall-flowers	0·10

The internal surface of the receptacular wall was quite smooth. The interior of the cavity was of a pale umber tint over the area of the ostiolar bracts and the male flowers, and dark umber over the rest of the surface, due to the deep tint of the dry stigmata and styles.

2.	External diameter	2″·05
	Diameter of area of ostiolar bracts in the cavity	0″·58 × 0″·47
	Breadth of zone of male flowers	0″·21
	Breadth of peripheral furrow of gall-flowers around the male flowers on the ostiolar face of the cavity	0″·21
	Thickness of receptacular wall	0″·32
	Depth of stratum of gall-flowers	0″·10

The ostiolar bracts formed a projecting mass at the same level as the surrounding male flowers. The internal surface of the receptacular wall was smooth. The male flowers were arranged in three or four rows.

3.	External diameter	2″·33
	Diameter of area of ostiolar bracts in the cavity	0″·62 × 0″·5
	Breadth of zone of male flowers	0″·19
	Breadth of peripheral area of gall-flowers on ostiolar face	0″·3
	Thickness of receptacular wall	0″·3
	Depth of stratum of gall-flowers	0″·09

The ostiolar bracts formed a central boss on the same level as the male flowers, which were arranged in three rows. The male flowers and their investing bracts were of almost the same height. The perianth consisted of two outer overlapping leaves and of a continuous closed hood investing the stamens the filaments of which were very short.

4. Diameter of area occupied by ostiolar bracts in the cavity	0″·42 to 0″·48
Breadth of zone of male flowers	0″ 18
Breadth of peripheral furrow of gall-flowers around zone of male flowers	0″·18

The area occupied by the ostiolar bracts was flat, and was surrounded by a somewhat elevated rim composed of the male flowers.

From the above data it is evident that in very many cases hardly any appreciable changes occur in gall-receptacles to which insects do not gain entrance after the normal period for access has been passed (Plate IV, fig. 23). A very slight general enlargement may take place, and a certain increase in depth of the stratum of gall-flowers, due to elongation in the pedicels of some of the flowers. There is, however, comparatively little increase in the size of the ovaries, and they therefore remain arranged in a single, or at utmost in a double stratum. Due to the very slight increase in bulk of the gall-flower stratum, there is no need for any increase in the surface to which it is adapted, and the interior of the receptacular wall remains smooth throughout. The cavity of the receptacle remains empty, no fluid accumulating within it. In many cases the male flowers remain practically arrested at the stage of evolution which they have attained at the normal period for access of insects. In some cases, however, a certain amount of further evolution occurs, the flowers increasing in height, and their swollen apices coming to project beyond their investing bracts. In certain instances the growth is so considerable as to cause the zone of male flowers to form a prominent ridge around the central area occupied by the ostiolar bracts, and at the same time to be curved outwards over the peripheral furrow of gall-flowers so as almost entirely to conceal it from view.

II.—Female Receptacles.

A.—Characters of female receptacles at the stage when they are ready for the access of insects (Plate III, fig. 2).

The following are the measurements of a specimen of average size:—

External diameter	2″·0
Diameter of area of ostiolar bracts in the cavity	0″·52
Breadth of peripheral area on ostiolar aspect of the cavity occupied by flowers	0″·35
Thickness of solid ostiolar plug	0″·43
Thickness of receptacular wall	0″·24
Depth of floral stratum	0″·12

The area of ostiolar bracts formed a prominent mound on the centre of the ostiolar face of the cavity. It was of yellowish-white colour and the rest of the surface of a bright rose-madder tint, due to the continuous stratum of stigmata covering it. The ovaries were in two tiers, due to the fact that some of the flowers were sessile, while the others were shortly pedicellate. In spite of this the stigmas formed an almost even, uniform surface, partly due to absolute differences in the length of individual styles, partly due to those of the sessile flowers following a more straight-lined course (Plate III, fig. 5).

B.—Characters of female receptacles after the access of insects and prior to complete maturation.

The following measurements were taken from a receptacle a few days after the entrance of insects to its cavity:—

Diameter of area of ostiolar bracts in the cavity	0"·77
Depth of ostiolar plug	0"·52
Thickness of receptacular wall	0"·34
Depth of stratum of flowers	0"·15

The ovaries were already visibly enlarged.

The first and constant change which manifests itself is an increase in the thickness of the stratum of flowers, due to increased bulk, specially of the ovaries, and a consequent decreased prominence of the mass of ostiolar bracts. In some cases the colour of the stigmatic surface remains for long almost or quite unaltered, but in others the tint changes from pure rose-madder to more or less brownish or brick-red. There is, however, never any tendency to withering or drying of the styles and stigmata, which, with the exception of the bases of the styles, remain persistent up to the period of full maturation and after the perianth has dried up and the outer coats of the ovary and of great part of the axis of the flower have undergone gelatinous degeneration. As in the case of gall-receptacles after the access of insects, the increase in bulk of the ovaries is altogether out of proportion to that of the surface from which the flowers arise, and space for them is obtained by their becoming arranged in superimposed strata, due to unequal growth of the pedicels. As, however, the increase in bulk is not merely so great as is the case with the ovaries of the gall-flowers, the number of strata is not so great, only four or five being present in many cases, and six or seven in exceptional ones (Plate III, fig. 4). Another feature related to the minor amplification of the ovaries in female receptacles is that the receptacular wall remains smooth throughout in place of acquiring increased surface by means of inequalities as that of gall-flower receptacles does. Just as in the case of gall-flower receptacles, the cavity becomes filled by fluid shortly after the access of the insects. The fluid differs from that of the other receptacles in being clear, colourless, or at utmost pale yellowish, and watery with only a few suspended particles, and in having an absolutely neutral reaction and a specific gravity only of 1000.

C.—Characters of fully mature female receptacles to which insects have gained access (Plate III, figs. 4, 6, 7).

The following are measurements taken from such a receptacle:—

External diameter	2"·3
Diameter of area of ostiolar bracts in the cavity	0"·42
Thickness of receptacular wall	0"·24
Depth of stratum of flowers	0"·30

This specimen was one of average size, and considerably larger ones occur. Their dimensions, however, never approach those attained by the larger gall receptacles, the external diameter even in exceptionally large specimens being only about 2·75. The external surface is of a beautiful brick-red and yellow colour, being much more brightly tinted than that of the mature gall-receptacles ever is. As in the case of the latter, the receptacular fluid is absorbed as maturation approaches, and in fully ripe figs the cavity is empty. The interior surface is beautifully coloured, the bright yellow achenes shining through the transparent gelatinous material into which the outer coats of the ovaries have become resolved, and contrasting with the warm red colour of the stigmata and perianths. The substance of the receptacular wall is pale pink (Plate III, fig. 7).

D.—Characters of mature female receptacles to which insects have not gained access.

If insects fail to gain access at the time when the receptacles are ready for them, very little change usually occurs during maturation save a gradual change of colour in the stigmatic surface to a strong brick-red and a gradual drying up of all the tissues. A slight increase in thickness of the stratum of flowers may take place, but due merely to elongation of the pedicels, and not as a rule to any ovarian enlargement. In certain cases, however, phenomena parallel to those occurring in those gall-flower receptacles, in which considerable growth of the male flowers occurs after the period for access of insects, but where access has not taken place, present themselves. In these a general enlargement of the flowers evidently takes place, and a varying, but sometimes considerable, number of the ovaries becomes conspicuously enlarged, forming in the first place a series of brilliant white eminences on the general red of the stigmatic surface where the affected flowers are pedicellate (Plate III, fig. 3), and ultimately in outward appearance coming to be identical with normal ripe ones, save that the outer coats of the ovary do not soften and gelatinize, and therefore do not allow the bright yellow of the sclerosed inner ones to shine quite so clearly through them. The growth of achenes in such cases only occurs in isolated flowers, and never over the entire surface as after insect access, and it is unaccompanied by any accumulation of fluid within the receptacular cavity—a circumstance which is probably causally related to the defective softening of the outer coats of the ovaries noted above. The general thickness of the floral stratum in such receptacles may amount to 0·17,″ and the ovaries may be arranged in four or five tiers. Achene formation may occur in sessile as well as in pedicellate flowers, and when it occurs in tall specimens of the latter, the mature achenes project somewhat above the general surface.

The flowers of Ficus Roxburghii.

In proceeding to a description of the several kinds of flowers present in the receptacles of *Ficus Roxburghii*, it is again necessary to give details regarding the phenomena present at different periods and under the influence of different conditions.

I.—MALE FLOWERS.

A.—Characters at the period for access of insects to the receptacle.

The stamens are at this time enclosed within three complete coverings. Externally is a large sheathing bract, which forms a hood over the summit of the entire flower and at utmost presents a mere fissure at one side (Plate IV, fig. 8). Within this is a complete coat formed of the two, or in exceptional cases one or three, overlapping lobes of the outer perianth, and internal to this is the truly closed hood of the inner perianth, which forms a special protective covering for the stamens during the long period in which the flowers in galled receptacles are immersed in the receptacular fluid, and which is only ruptured when the latter is drying up.

The following figures show the dimensions of a flower at this stage:—

Total height	1·3 mm.
Greatest breadth	1·02 mm.
Height after removal of the outer perianth	1·02 mm.
Breadth after removal of outer perianth	0·6 mm.
Total height of stamens	0·4560 mm.
Length of filaments	0·1710 mm.
Breadth from face of anther-lobe to back of connective	0·1995 mm.

The flowers are practically sessile, the filaments of the stamens are rudimentary, and the anther-lobes very small and semi-transparent.

B.—Characters of male flowers in mature gall-receptacles to which insects have gained access.

The following are the measurements of one:—

Total height from base of pedicel to apex of anthers	11·6 mm.
Height from base of pedicel to origin of outer perianth	3 3 mm.
Height from base of pedicel to bases of filaments	6·3 mm.
Length of filaments	4·5 mm.
Diameters of anthers	1 × 1·1 mm.

All the flowers have a large sheathing bract inserted at the origin of the pedicel (Plate II, fig. 1). Most have two lobes in the outer perianth (Plate II, fig. 1; Plate IV, fig. 1, a), some have only one, and monstrous flowers may have three. In such cases the axis at some little distance above the origin of the outer perianth divides into two branches, each of which bears a distinct inner perianth and stamens. The lobes of the outer perianth differ greatly in different instances in the extent to which they are separated from one another inferiorly. In some cases they are distinct throughout, but in most they are confluent inferiorly, and in some they are merely indicated by a shallow depression of the apex of one broad leaf. The ruptured inner perianth forms a funnel-shaped sheath around the upper portion of the axis and the bases of the filaments (Plate IV, fig. 1). The upper margin is ragged, the outline varying according to the precise fashion in which rupture has originally occurred and the extent to which the filaments have lacerated it in their final expansion. The stamens are two or three in number and are widely divergent (Plate IV, fig. 1, b), and the anther-lobes dehiscent by a fissure along the face. In a very large number of flowers a rudimentary ovary, style, and stigma terminate the axis between the bases of the filaments (Plate IV, figs. 1, 2, 3).

The pollen-grains are very small, having diameters, when fresh, of $14{\cdot}5 \times 8{\cdot}6\mu$, and when mounted in Canada balsam of $13{\cdot}2 \times 6{\cdot}6\mu$. They are normally oval with truncate extremities, where the cell wall is thinner than elsewhere, and which form the sites of exit for the pollen-tubes; when in mass they are, when fresh, pure white. In certain cases, in place of presenting the normal figure, they have the form of triangles the points of which have been cut off, and here there are three sites at which pollen-tubes may emerge. As a rule, they contain two nuclei—one rounded, the other oval or rod-like (Plate IV, fig. 7). The pollen does not tend to escape from the anthers after dehiscence if the stamens are undisturbed by insects.

The growth occurring between the period of access of insects and that of maturation is very great, but up to a comparatively late period is almost limited to the axes of the flowers. Elongation of the axis takes place both beneath the origin of the outer perianth, so that the flower ceases to be sessile, and above it, causing the closed inner perianth to force the leaves of the outer one apart and appear prominently beyond them, and forcing the summit of the terminal portion of the axis with the stamens more and more against the cupola of the inner perianth. The flower at the same time emerges from within the sheathing bract and projects beyond it. The filaments for long remain almost unaltered in length while maturative changes are occurring within the anthers. This is, no doubt, related to the retention of the stamens within the closed inner perianth, and the consequent protection of the anthers from maceration in the receptacular fluid. There is comparatively little increase in size of the anthers for some time, but the evolution of the pollen goes on, tetrads being soon replaced by distinct small grains of normal form. These are at first uninucleate, and measure about $9{\cdot}9 \times 6{\cdot}6\mu$. in diameter. Distinct grains of such character are present within the anthers at a time when the lobes of the outer perianth have only begun to separate and the filaments show no appreciable elongation. As maturation approaches, and just before the absorption of the receptacular fluid, the anthers become visibly swollen and the filaments begin to grow rapidly. As the stamens are still enclosed within the closed cavity of the inner perianth, the elongating filaments are not free to grow directly onwards or outwards, but become extremely folded upon themselves, the basal portion running downwards along the sides of the axis, and the distal halves being folded upwards more or less parallel to them (Plate IV, fig. 1, a).

The inner perianth becomes more and more stretched by the increasing bulk of the stamens and the upward growth of the terminal portion of the axis from which they arise, and the tension ultimately becomes so great that rupture occurs. As a rule, this occurs at the summit, so that the inner perianth comes to form a cup or funnel around the upper part of the flower; but in some instances it takes place at the base, and the perianth is then carried upwards as a cap on the apex of the axis and the stamens until the latter expand and lacerate it. Rupture of the inner perianth does not usually occur until the absorption of the receptacular fluid has taken place, but in exceptional cases it may partially occur before the fluid has entirely disappeared. Once rupture has taken place, the complete evolution of the flower occurs with great rapidity. The stamens become widely divergent and protrude far beyond the ruptured perianth (Plate II, fig. 1, b). The extreme protrusion is due partly to the tip of the axis rising on the removal of the restraining pressure of the perianth, and partly to continued growth in the stamens, but to a much greater extent to mere unfolding of the filaments. The divergence of the stamens varies in degree in different instances, and is specially marked in flowers in which abortive female organs are present. Dehiscence next sets in in the faces of the lobes of the oval anthers, but, as previously mentioned, spontaneous discharge of pollen does not seem to occur.

C.—Characters of male flowers in mature gall-receptacles to which insects have not gained access.

In many cases little or no farther growth seems to take place after the time at which the receptacle was ready for the access of insects, and the flowers merely undergo a gradual process of desiccation. In some, however, as has been already mentioned in describing the receptacles, a certain amount of evolution occurs, the flowers increasing considerably in length and, with their bracts, coming to form an elevated and reflected band around the area of sterile ostiolar bracts. The flowers only rarely project beyond their proper bracts, and the outer perianth remains closed, due to the persistent overlapping of its lobes. The following were the measurements of such a flower:—

Total height	4·6 mm.
Height of stamens	2·5 mm.
Breadth from face of anther-lobes to most prominent part of connective	1·0 mm.

The flowers, thus, in such cases of partial maturation, independent of the access of insects, acquire dimensions four or five times as great as they have at the proper period for the occurrence of access. The anthers become much more conspicuous, and acquire a yellowish-white tint, but the filaments remain almost unaltered in length (Plate IV, fig. 4). Transverse sections through the anther-lobes show that the evolution of pollen has advanced to the stage of the formation of tetrads (Plate IV, figs. 5, 6). These form dense masses surrounded by a double stratum of large tapetal cells, which in its turn is for the greater part embedded in tissue the cells of which have undergone fibrous resolution. This fibrillation has advanced to the greatest extent between the loculi and along the central portions of the faces of the lobes. In the latter site even the epidermal cells have disappeared, and the loculi are only covered by the persistent cuticle and the subjacent fibrous stratum (Plate IV, fig. 5). The evolution of the anthers, however, never advances beyond this stage if insects do not gain access to the receptacle, and distinct pollen-grains are never formed.

II.—Gall-Flowers.

A.—Characters of gall-flowers at the period for access of insects to the receptacles.

The following are the measurements of various specimens, some of the flowers being sessile and others shortly pedicellate:—

1. Averages of six flowers—	
Height from base of pedicel to summit of ovary	0·456 mm.
Greatest breadth of ovary	0·436 mm.
Length of style along its inner side	0·478 mm.
Diameter of stigma	0·285 mm.
2. Height from base of pedicel to stigma, which at this time is the highest point	0·826 mm.
Height from base of pedicel to ovary	0·427 mm.
Greatest breadth of ovary	0·399 mm.
Length of style along its inner side	0·256 mm.
3. Average length of styles in ten flowers—	
Along inner side	0·376 mm.

ranging from 0·285 mm. to 0·427 mm.

4. Average length of styles in five flowers—	
Along inner edge	0·384 mm.

5. Total height of flower from base of pedicel to stigma	1·28 mm.
Height from base of pedicel to top of ovary	0·912 mm.
Greatest breadth of flower, including the perianth	0·484 mm.
Length of style along inner side	0·427 mm.

6. Average measurements of large pedicellate flowers—

Total height from base of pedicel to stigma	1·5 mm.
Height from base of pedicel to origin of perianth	0·4 to 0·5 mm.
Height from origin of perianth to ovary	0·25 mm.
Height from base of ovary to its summit	0·48 mm.
Length of style along inner side	0·48 mm.
Breadth of stigma	0·2 mm.

Considerable variations exist in the total heights of the flowers, these being mainly determined by the absence or presence of a pedicel (Plate II, figs. 2, 4), but also to some degree by variations in the lengths of the styles. The gamophyllous perianth has three lobes, a broad one being situate opposite to the side of stylar attachment, and two narrow ones passing upwards, one on each side of the base of the style (Plate II, fig. 4). The tips of all three lobes rise above the level of the summit of the ovary, and that of the large one curves over it. The style is attached practically to one side of the summit of the ovary, which is flattened or only slightly convex (Plate II, fig. 4; Plate IV, fig. 19). The stigma is trumpet-shaped, or in some cases furrowed. The bottom of the hollow communicates by a small orifice with a canal which descends through about three-fourths of the length of the style, narrowing as it does so and coming to a pointed end at some distance from the ovary (Plate IV, fig. 19). The lower fourth of the style is solid throughout. Its external surface is quite smooth throughout. The stigma and the upper portion of the styles have a more or less pronounced pink tint, due to the presence of varying numbers of coloured cells; the ovary and perianth are colourless.

The ovary externally is broadly oval, and its cavity is almost circular (Plate IV, fig. 19). Its walls vary greatly in thickness in different parts, being much thickest along the side of stylar insertion, thinning off thence in every direction, and becoming very thin on the side opposite to the style. The following figures show the thickness of the walls at different points in one flower:—

Thickness at origin of the inner side of the style	0·05 mm.
Thickness over the middle of the summit of the ovary	0·04 mm.
Thickness over surface of ovary on the side opposite that of stylar attachment	0·015

Along the inner side of the base of the style and the neighbouring areas of the ovarian wall the epidermal cells are shortly columnar and have somewhat thickened walls (Plate IV, fig. 19). Further out they become thin-walled and squarish, and over the rest of the surface except the basal portions, where they again tend to become cylindrical, they are more or less flattened. There are four distinct layers in the thickness of the walls (Plate V, fig. 22). Immediately beneath the outer epidermis is a single stratum of flattened cells, which at this stage stain like the epidermal ones; beneath it is a thick layer of four cr five superimposed strata of small cells, which take a pink tint with picrocarmine, and within this is the inner epidermis, the flattened cells of which, like those of the outer epidermis and hypodermis, are stained yellowish.

The ovule presents a more or less rounded outline, due to the great thickness of the funicle and of the secundine of the funicular side at this stage of development (Plate IV, fig. 19). The free portion of the funicle is very short, being only about 0·01 mm. in length by 0·09 mm. in breadth.

It arises immediately beneath the base of the style, and the fibrovascular bundle curves abruptly downwards, and is continued in a raphe to the base of the more or less erect nucellus (Plate IV, fig. 19). The thickness of the secundine along the raphe and the stylar aspect of the upper part of the nucellus is very great; so great, in fact, as not to suggest an integument, but a solid mass of tissue into one side of which the nucellus is inserted. In a case in which the thickness was measured, at the point of greatest depth it was 0·04 mm. The entire ovule in this specimen was 0·20 mm. in length by 0·15 mm. in breadth, and the nucellus had a height of 0·15 mm., a greatest breadth of 0·09 mm., and a breadth in the micropyle of 0·06 mm. The secundine, especially on the funicular aspect, appears to be but loosely connected superiorly with the nucellus, and tends to separate more or less from it towards the micropyle (Plate IV, fig. 19). The nucellus is erect or slightly inclined outwards, and is practically straight, its apex facing the under surface of the wall of the top of the ovary (Plate IV, fig. 19). The micropyle, as the measurements given above show, is relatively very large. The epidermal stratum of the nucellus presents a general resemblance to that of the ovules in the normal female flowers, being thin and composed of flattened cells over the greater part of the surface, and forming a conspicuously thickened mass which plugs the orifice of the micropyle. This plug is not, however, so thick as in the female flowers, and is apparently also of looser texture than in them. Within the epidermal coat a stratum of loose tissue is present around the embryo-sac. It also generally resembles that present in the ovules of the normal female flowers, but at the same time it does not form a definite dense cap over the apex of the embryo-sac as it does in them, there being merely a certain thickening of the common loose tissue there.

B.—Characters of gall-flowers subsequent to access of insects to the receptacle.

The following figures show the measurements of a gall-flower shortly after access of insects to the receptacle, and containing an insect's ovum which as yet showed no signs of segmentation :—

Total height from base of pedicel to summit of the stigma . . .	2·850 mm.
Height from base of pedicel to summit of ovary	2·7075 mm.
Length of style along the inner side	0·4275 mm.
Length of pedicel below the origin of the pearinth	1·282
Transverse diameter of ovary	0·5700

Ovules at this stage have an obovate form, and when removed from the ovaries and collapsed, due to extraction of the fluid from the interior of the embryo-sac in the course of preparation, measure about 0·8 × 0·6 mm., and in their normal condition about 0·8 × 0·57.

From the above figures it is evident that the deposition of ova causes a very rapid and considerable increase in the size of the flowers generally, the increase being invariable in the ovaries and ovules, but in many cases occurring in the axis also, and determining very conspicuous elongation of the pedicels. The enlargement in the ovules appears for the most part to be due to mere extension of pre-existent cell elements under the influence of distention of the embryo-sac, due to a large accumulation of fluid within its cavity; but a certain amount of active protoplasmic accumulation, and even of cell multiplication, appears to take place in the deeper nucellar tissue. The cells of the latter appear to be rich in protoplasm, and stain deeply with carmine, and at some points specially deeply-stained patches are present which appear to correspond with localised centres of specially active growth (Plate IV, fig. 14). Towards the apex of the nucellus there is generally a special accumulation of cells belonging to the deeper stratum, but these do not differ from their neighbours elsewhere, and never form a dense coherent mass like the apical cap of the deeper nucellar tissue in normal female flowers (Plate IV, fig. 15). The nucellar epidermis presents features very similar to those characterising it previous to the access of insects. It forms a thin stratum over the greater part of the surface, becoming somewhat thicker at the base of the nucellus, and forming a plug at the micropyle. The latter is now relatively much smaller than it was, and is no longer vertical and at the summit of the ovule, but is directed to the funicular side, and often situated almost vertically over the funicle (Plate IV, fig. 14). The increase in vertical diameter of the ovule evidently takes place much more in a descending than an ascending direction, for the distance between the upper edge of the funicle and the micropyle and apex of the ovule remains comparatively short, while the raphe has undergone great elongation. The funicle and the secundine have now greatly reduced relative proportions, the former appearing as a short narrow cord, and the latter as a mere thin investing stratum. The increased bulk of the ovule is evidently principally determined by a great accumulation of fluid within the embryo-sac distending it and stretching the surrounding tissues.

The insect-ovum is not merely situated within the ovary: it is deposited within the ovule, or, more exactly, within the nucellus, lying between the epidermal stratum and the loose tissue surrounding the embryo-sac, at a point just below the insertion of the funicle (Plate IV, figs. 14, 16). It is pedicellate and of a long oval form, the pedicel being attached to the loose cellular tissue of the deeper nucellar coat (Plate IV, fig. 17). It has apparently two walls—an external one, with which the pedicel is connected, and an internal one around the large granular mass of protoplasmic contents. It is evident that considerable growth must occur subsequent to deposition and antecedent to the commencement of cleavage, as the bodies of ova at this period give diameters of 0·108 × 0·0342 mm., and contain a dense mass of protoplasm measuring 0·0855 × 0·0342 mm., whereas the spherical ova expressed from the bodies of female insects at the time of access have a diameter of only about 0·057 mm., and contain a netted protoplasm (Plate IV, figs. 17, 18). The pedicel is about 0·05 in length, and the lower extremity is slightly dilated (Plate IV, fig. 17).

Subsequently, during the period when the development of the insect is occurring, very little actual growth of ovular tissues occurs, the inner coat of the nucellus and the embryo-sac appear to atrophy and disappear completely, and the nucellar epidermis and secundine become gradually converted into a delicate sheath investing the body of the embryo. The inner cells of this sheath, presumably representing the nucellar epidermis, become greatly extended in surface and altered in form, and the stretching of the tissue tends to separate them from one another, so that large intercellular intervals come to be present among them. At the same time they become very poor in protoplasm, but retain their nuclei for a very considerable time (Plate IV, fig. 20).

The walls of the ovary increase in thickness, but to a much less degree than in the true female flowers, the depth in mature ones not being more than double what it is at the period of access. Figure 25 of Plate IV shows the appearance of the ovarian wall in a gall-flower approaching maturity. It shows that very considerable increase in the size of the cells, and specially extension in their areas, has occurred. The external epidermis is thickly cuticularized, and the walls of the internal epidermis and the stratum external to it are considerably thickened. There is no softening of the external strata of cells similar to that occurring in the ovaries of true female flowers during maturation.

The total increase in bulk of the gall-flowers during maturation is enormous, and far exceeds that occurring in the case of the true female ones. The ovaries ultimately become about three times as large as they were at the period of insect access, and in many cases there is excessive growth in the pedicels. The actual length of pedicels in mature flowers varies greatly. In some cases the flowers remain almost or quite sessile; in others the pedicels may be as much as eight times longer than they are in any pedicellate flowers at the period of access. There is little or no increase in size in either the perianth or the style and stigma subsequent to insect access. In mature flowers the perianth forms a mere cup around the base of the enlarged and projecting ovary, and the styles, in place of being at one side of the apex, arise so far down the lateral surfaces that the stigmas are situated at a lower level than the now rounded summits of the ovaries (Plate II, fig. 3).

C.—Characters of gall-flowers in mature receptacles to which insects have not attained access.

A certain amount of growth occurs, so that the flowers externally come to resemble those in receptacles shortly after the access of insects. The following are the measurements of a tall pedicellate flower:—

Total height from base of pedicel to stigma	2·707 mm.
Height to lower part of ovary	1·56 mm.
Height to base of ovule	1·68 mm.
Height from level of origin of perianth to top of ovary	1·08 mm.
Length of style	0·627 mm.
Diameter of stigma	0·313 mm.
Diameters of ovule	0·4275 × 0·285 mm.

The ovule is reduced to the condition of a dry thin-walled sac surrounding the large empty cavity of the embryo-sac. The increased size of the flowers is mainly due to growth in the pedicels, as the perianth still curves over the top of the ovary.

III.—TRUE FEMALE FLOWERS.

A.—Characters of female flowers at the period of access of insects to the receptacle. (Plate II, figs. 5, 6).

As in the case of the gall-flowers, while the size of the ovaries is fairly constant at this stage, that of the flowers as a whole varies considerably, due to the fact that while some are sessile, others have pedicels of varying length (Plate III, fig. 5).

The following figures show the measurements of two flowers with well-developed pedicels:—

1.	Height from base of pedicel to the lower edge of the insertion of the style	1·51 mm.
	Height from the lower edge of the stylar insertion to the summit of the ovary	0·62 mm.
	Total height from base of pedicel to summit of ovary	2·13 mm.
	Height from summit of ovary to summit of curved style and stigma	1·28 mm.
	Height from base of pedicel to insertion of perianth	0·48 mm.
2.	Total height from base of pedicel to summit of ovary	1·25 mm.
	Height from base of pedicel to insertion of perianth	0·37 mm.
	Height from upper edge of stylar insertion to summit of ovary	0·25 mm.
	Height of ovary	0·5130 mm.
	Breadth of ovary at level of upper edge of stylar insertion	0·48 mm.
	Length of style and stigma	1·56 mm.
	Breadth of stigma	0·17 mm.

The gamophyllous perianth, as in the case of the gall-flowers, has three lobes: a broad one opposite the side of stylar insertion, and two narrow ones—much narrower than the corresponding ones in the gall-flowers—passing up one on either side of the base of the style. The lips of the lobes curve around the edges of the convex summit of the ovary. The style is inserted much lower down than in the case of the gall-flowers, the summit of the ovary always rising conspicuously above the site of insertion (Plate II, fig. 6). The style is relatively long, and over its upper half is clothed with long pointed hairs. The stigma is normally clavate and covered by the projecting extremities of the epidermal cells. In the case of one of the trees in Calcutta, however, the stigmata, in place of being clavate, are abruptly truncate, with more or less cup-shaped extremities, as though representing a condition intermediate between that proper to true female and gall-flowers. In the fresh state the stigma is of a bright rose-madder tint, and the style and perianth are pale pink. The ovary is broadly oval externally, and contains a large oval cavity. The walls are thick, especially at the apex (Plate V, fig. 1). Like those of the gall-flowers, they are composed of four distinct strata, an external and internal epidermis, and two intermediate layers. The characters of the component cells, and specially those of the epidermal strata, are very different from those in the corresponding tissues in the gall flowers (Plate V, figs. 1, 17). The external epidermis is formed of broad cylindrical cells with a distinct cuticular covering. The hypodermis consists of thin-walled cells, which, over the greater part of the surface, are arranged in two or three rows, but towards the apical thickening of the walls in four or five (Plate V, fig. 1). Beneath this lies a single stratum of very small cells, the nuclei of which are relatively large and stain very deeply with logwood. Many of these cells contain more than one nucleus. The cells of the internal epidermis are again cylindrical, and frequently present a more or less sinuous outline. Covering their internal extremities, and lining the ovarian cavity, is a thin but well-differentiated cuticle, which tends readily to separate in the course of preparation of specimens. The following figures show the thickness of the entire wall and of the individual strata over the greater part of the ovary:—

Total thickness of the wall		0·099 mm.
Thickness of external epidermis		0·0231 mm.
Ditto	hypodermis	0·0330 mm.
Ditto	stratum of small cells	0·0099.
Ditto	internal epidermis	0·0330.

Over the summit of the ovary the total thickness is considerably greater, mainly due to the increased accumulation of hypodermal tissue there.

The ovules are both much larger, and also evidently at a more advanced stage of evolution than they are in the gall-flowers of gall-receptacles at the period of access of insects.

The measurements of specimens of average dimensions when freshly removed from the ovaries and not compressed are 0·3420 × 0·1995 mm. In place of presenting a more or less rounded outline like the ovules of gall-flowers at a corresponding period, they have a long oval figure (Plate II, fig. 6; Plate V, fig. 8). The funicle is attached to the ovule much lower down than it is in gall-flowers, this being related to the fact of the lateral in place of apical insertion of the style, as the origin of the funicle is here, as in the gall-flowers, invariably situated just below the base of the latter. In consequence of this the raphe is of course relatively short. The ovule as a whole stands almost erect in the ovarian cavity, with only a slight inclination to the stylar side; but the nucellus is curved so far as to bring the micropyle almost vertically over the funicular insertion (Plate II, fig. 6). The free portion of the funicle is very short, and the fibro-vascular bundle is curved sharply downwards and continued in a raphe to the base of the ovule, where the vessels become continuous with a mass of spiral cells, which form a cup-like expansion over the latter. The fibro-vascular bundle of the funicle arises at some distance below the base of the ovary, due to dichotomy of that of the axis, and curves outwards, upwards and inwards, so as to reach the cavity of the ovary just beneath the level of the origin of the style (Plate II, fig. 6). The other bundle resulting from the dichotomy ascends on the opposite side of the ovary, and tapers off and disappears at a level corresponding to that at which its neighbour enters the ovarian cavity (Plate II, fig. 6). The origin of the funicular fibro-vascular bundle is certainly not of this character in the true female flowers of all species of ficus. For example, in those of *F. hispida* there is no dichotomy of the axial bundle, but the latter, as a whole, is diverted to one side and continued as the funicular one.

The secundine consists of elongated cells with their long axes parallel to that of the ovary (Plate V, fig. 1). The cell-walls are thin, the cytoplasm scanty, and the nucleus small and staining feebly, with logwood or carmine. Its thickness varies greatly over different parts of the surface of the nucellus. It is thinnest over the side opposite that to which the funicle is attached, and in great part here contains only two strata of cells. It is also relatively thin over the base of the nucellus. On the side of attachment of the funicle it attains its greatest thickness, a prominent ridge passing upwards from the site where the funicle passes into the raphe to the micropyle, and gradually subsiding on either side and towards the latter. It leaves a large micropyle through which a thick mass of cells belonging to the nucellar epidermis projects (Plate V, fig. 1).

The characters of the nucellus are somewhat peculiar and require detailed description. The epidermal stratum varies greatly in thickness and in the character of its constituent cells in different places. Except at the base and true apex of the nucellus, it is thin, containing not more than from one to three strata of very minute, elongated cells with their long axes parallel to that of the ovule (Plate V, figs. 1, 21). They contain relatively large nuclei, which stain deeply with logwood or picrocarmine, the cell-walls acquiring a brownish tint with the latter reagent (Plate V, fig. 8). At the base it thickens out into a solid mass of cells, which rests as in a cup in the expansion composed of spiral cells in which the spiral vessels of the raphe terminate, and is in contact above with the thick basal portion of the delicate cellular tissue surrounding the embryo-sac (Plate V, figs. 7, 21). At the apex also a great accumulation of cells is present, forming a solid plug containing five or six strata which fills the micropylar orifice and projects somewhat beyond it (Plate V, fig. 1). The cells in both the basal and micropylar thickenings differ in form from those in the rest of the epidermal stratum, as they are square or polygonal in place of flattened.

Within the epidermal stratum is a coating of delicate, loose cellular tissue surrounding the large embryo-sac. This also presents basal and apical thickenings where the tissue becomes much denser and more coherent than it is eleswhere (Plate V, figs. 1, 7). The basal thickening consists of many superimposed strata of cells, which are frequently associated so as to form more or less distinctly defined lobes (Plate V, fig. 7). The apical thickening is very peculiar (Plate V, fig. 1). It forms a dense, broadly conical mass capping the apex of the embryo-sac. The constituent cells are closely adapted to one another, are quadrangular or polygonal in outline, and contain relatively large, deeply-staining nuclei. Centrally the cap is of great thickness, containing six or seven strata of cells (Plate V, fig. 1). It thins off all round peripherally, and gradually subsides into the surrounding loose cellular tissue covering the lateral surfaces of the embryo-sac. Under the influence of the reagents employed in mounting permanent specimens of ovules, and specially of entire ovules, the inner nucellar coat frequently shrinks away from the epidermal one save at the base, so as to leave a clear space between them (Plate V, fig. 8). The walls of the cells do not show the brownish tinge with picrocarmine which those of the epidermal stratum do, and the large nuclei, save in the apical thickening, stain comparatively feebly.

Within the general mass of nucellar parenchyma, as this stratum may be conveniently termed, and immediately around the embryo-sac, a certain number of small flattened cells, appearing fusiform in profile, are present (Plate V, fig. 1). These are most abundant, as a rule, towards the apex of the nucellus. Immediately beneath the apical cap, and attached to one of its constituent cells, is a large and peculiar cell of this type (Plate V, figs. 1, 2, 3, 4, 5, 6). In sectional view it appears as a curved spindle with the centre of the convex surface attached to the under surface of the apical cap, and the prominence of the concave one in contact with, or in close relation to, the outer surface of the apex of the embryo-sac. This prominence is sometimes very marked, and where the embryo-sac has not shrunk too far away in the course of preparation of the specimen, it often appears to depress its apex, while the two pointed extremities of the spindle project free on either side as lateral horns (Plate V, fig. 6). The entire body of the spindle is characterised by staining very deeply, especially with logwood.

The centre of the nucellus is occupied by a huge embryo-sac, with a delicate membranous wall, a network of finely molecular protoplasm, and a large nucleolate nucleus (Plate V, fig. 3). There do not, as a rule, appear to be any oosphere, synergidæ, or antipodal cells. Only in one case have I been able to detect anything which might possibly be taken to represent an oosphere and synergidæ, and in that the appearances were doubtful, and such as could only correspond with elements of very abortive character.

B.—Characters of female flowers shortly after access of insects to the receptacles.

The following show the measurements of a pedicellate flower a few days after the access of insects to the receptacle:—

Total height from base of pedicel to summit of ovary	3·02 mm.
Height from base to origin of the perianth	1·34 mm.
Total height of ovary	0·79 mm.

Breadth of ovary at level of upper edge of stylar insertion	0·65 mm.
Height from upper edge of stylar insertion to summit of ovary	0·51 mm.
Total length of style and stigma	1·56 mm.
Breadth of stigma	0·17 mm.

These figures very clearly indicate the occurrence of rapid growth in the ovaries and, in the case of pedicellate flowers, in the pedicels subsequent to the access of insects. The perianth retains its previous dimensions, and the ovary consequently comes to project more and more from it. Even at the early stage represented by the flowers of which measurements have been given, the summit of the ovary rises high above the tips of the perianth. The origin of the style, just as in the case of the gall-flowers, appears to descend, due to excessive growth in the upper part of the ovary, and in some cases the colour of the upper parts of the styles and the stigmata gradually changes from rose-madder to brick-red. Beyond this neither styles nor stigmata show any change, and, with the exception of the basal portion of the style, which ultimately becomes softened, remain persistent up to the period of maturation of the seeds and long after the outer coats of the ovary have undergone mucoid degeneration. The walls of the ovary gradually thicken, the increase being mainly due to changes taking place in the two inner strata; the cells of the internal epidermis increasing in depth and in the thickness of their walls, and processes of cell multiplication occurring in the stratum of small cells lying external to them. The general increase in the bulk of the flowers even within a few days subsequent to access of insects to the receptacles is so considerable as to be very evident even to casual inspection by the unaided eye. The important phenomena are those manifesting themselves in the ovules. These, when removed from the ovaries a few days after access of insects to the receptacles and examined in water and uncovered so as to avoid flattening, give diameters of about 0·51 × 0·34 mm. The secundine and nucellar epidermis show no important changes save those dependent on extension, due to increased bulk of the deeper parts of the nucellus, but conspicuous changes soon set in in the nucellar parenchyma and embryo-sac. In the former there is, firstly, general growth around the sides of the embryo-sac, and secondly, special growth at its base and apex. The cells of the loose tissue of the parenchyma begin to increase in size, they stain much more deeply than they did previously, and there is an obvious accumulation of protoplasm within them (Plate V, fig. 9). Beneath the base of the embryo-sac the accumulation of cells becomes thicker and denser than it was before, and in some cases, at all events, a peculiar local outgrowth takes place on its upper surface, giving rise to a prominent circular mound of very small-celled tissue surrounding a central depression, and apparently strongly cuticularised on the surface (Plate V, fig. 16). As it is developed, it pushes up and invaginates the lower end of the embryo-sac.

The walls of the cells of the apical cap generally become considerably thickened, but do not otherwise show any appreciable change. The special cell attached to its under surface, and which appears as a deeply-stained spindle in section, on the other hand, undergoes very remarkable development. It swells up centrally, and at the same time the peripheral portions shoot out into large processes and become gradually separated by partitions from the central dilatation (Plate V, figs. 11, 12). In sections it would appear as though we were dealing with changes occurring in a simple spindle, but, judging from the appearances present in some cases in entire or partially-dissected ovules, it appears to be probable that in reality the cell originally consists of a central more or less convex mass with radiant and pointed processes passing off from it in various directions (Plate V, fig. 11), and that in the course of evolution it becomes separated into a central, prominent dilation, and a series of horn-like cells radiating from it. Be this as it may, at this stage there is a prominent central cell pressing down upon the outer surface of the embryo-sac, and two or more elongated peripheral ones arising from it laterally and clasping the adjacent surfaces of the sac (Plate V, figs. 14, 15). At this period the apex of the embryo-sac is still readily separable from the cells, the site of contact with the central one, however, being sometimes recognisable after separation has taken place, due to its staining differently from the rest of the sac-wall (Plate V, fig. 13). The central cell continues to increase more and more in prominence, pressing down, invaginating, and apparently ultimately penetrating through the apex of the embryo-sac, and, at the same time, the peripheral cells shoot out into long horn-like processes with dilated bases adherent to the sides of the central one, and frequently showing secondary dilations farther out, which, like the basal ones, are nucleate (Plate V, figs. 12, 14, 15). From their position and relations to neighbouring structures, these lateral processes appear to be specially adapted to fix the central cell as it presses down on the apex of the embryo-sac. Subsequently, as the result of a process of free-cell formation, or rather, perhaps, of rejuvescence followed by cell-division on the part of the contents of the central cell, a series of three cells arises within it arranged in linear series (Plate V, fig. 12). The two first of these appear to play the part of a suspensor, the basal one appearing to be adherent above to the membrane of the mother-cell, and therefore through it to the under surface of the apical cap of the nucellar parenchyma. The distal or inferior cell swells up, becoming, first, more or less hemispherical and then broadly clavate, and the dense protoplasmic contents give origin by free cell division to an aggregate of nucleate protoplasts constituting the pro-embryo (Plate V, figs. 12, 14, 15). At this stage the central cell and its contents measure about 0·033 × 0·016 mm. Subsequently, as increased growth in the secondary cells goes on, they come to press upon the interior of the walls of the parent one, and its outlines become undistinguishable.

The embryo-sac remains apparently structurally unaltered for a short time after the access of insects to the receptacle, merely increasing in capacity, due to accumulation of fluid within it. At a period when the embryogenic cell already has begun to enlarge, and its central portion to press down on and adhere to the apex of the sac, the latter continues, in some cases at all events, to retain its original, single, large nucleus (Plate V, fig. 13). A little later, however, this disappears, and is replaced by a large number of much smaller secondary ones, which are scattered over the inner surface of the wall of the sac, and at the same time an increase in the substance of the network of cytoplasm seems to occur (Plate V, figs. 9, 10). So long as the embryogenic cell merely depresses the apex of the sac, the latter is readily separable under the influence of reagents from the apical cap of the nucellar parenchyma, but after adhesion or actual perforation of the apex has occurred, this is no longer the case, and the sac adheres so firmly to the cap that on several occasions I have been able to detach them from the rest of the ovule *en masse* by tearing off the micropylar extremity, the lower portion of the sac being drawn out of the inferior half of the ovule in the process of removing the two portions from one another. Time has not yet sufficed for an examination of the details of the evolution of the embryo after this stage has been reached, and I have therefore to proceed next to a description of certain of the characters presented by the mature flowers and their seeds.

C.—Characters of female flowers in mature receptacles which have been entered by insects.

The following figures show the measurements of two mature flowers from the same receptacle:—

1. Flower provided with a well-developed pedicel—

Total height from base of pedicel to apex of ovary	5·61 mm.
Height from base of pedicel to origin of perianth	2·85 mm.
Total height of ovary	1·05 mm.
Height from the upper edge of stylar insertion to apex of ovary	0·6 mm.
Breadth of ovary at level of upper edge of stylar insertion	0·88 mm.
Length of style and stigma	1·36 mm.
Breadth of stigma	0·14 mm.
Height of base of ovary above tips of perianth	0·2 mm.

2. Flower absolutely sessile—

Total height from base, *i.e.*, origin of perianth to summit of ovary	2·02 mm.
Height from base to level of bifurcation of the fibro-vascular bundle.	0·79 mm.
Height from bifurcation of fibro-vascular bundle to base of ovary proper	0·2 mm.
Total height of ovary	1·03 mm.
Height from the level of upper edge of stylar insertion to summit of ovary	0·54 mm.
Breadth of ovary at level of upper edge of stylar insertion	1·08 mm.

The following are the dimensions of an exceptionally tall flower:—

Total height from base of pedicel to summit of cuticular sheath of ovary	6·46 mm.
Height from base of pedicel to origin of perianth	3·50 mm.
Height from origin of perianth to level of bifurcation of fibro-vascular bundle	1·14 mm.
Height from bifurcation of fibro-vascular bundle to base of achene	0·54 mm.
Height of achene	0·99 mm.
Height from summit of achene to cuticular sheath of summit of ovary.	0·28 mm.
Height from level of upper edge of stylar insertion to summit of ovary	0·76 mm.
Breadth of ovary, including gelatinous sheath, at the level of upper edge of stylar insertion	1·22 mm.
Breadth, excluding gelatinous sheath	1·09 mm.

The total height of the flowers now varies very greatly on account of the varying amount of elongation of the axis, both below the origin of the perianth and between this point and the base of the ovary proper, which has taken place in different instances (Plate III, fig. 4). The peduncle is softened and semi-transparent, so that the fibro-vascular bundle can be seen shining through its substance. The lobes of the perianth retain their original size and are well preserved, not showing any signs of softening, but being dried up and of a reddish tint (Plate III, fig. 7). The portion of the axis between the origin of the perianth and the base of the ovary is much softened, and the tissue to a great extent converted into a transparent gelatinous substance in which the bifurcation of the vascular bundle beneath the ovary can be readily seen. The cuticular stratum of the entire ovary is widely separated from the subjacent tissues in the form of a delicate membranous sac containing a stratum of clear gelatinous material. The cells of the external epidermis beneath it are now no longer columnar, but broadly flask-shaped, and open externally by wide circular orifices (Plate V, fig. 19), markings corresponding to which are traceable on the inner surface of the detached cuticle.

The cells still adhere laterally to one another with considerable tenacity, and large sheets of them can therefore be readily detached. This is not so with the cells of the hypodermis, which are degenerate, softened, and so much loosened from one another as to form an incoherent gelatinous stratum (Plate V, fig. 20), save where the under portions of the deepest ones adhere to the outer surface of the achene to form a pseudo-cuticular coating to it (Plate V, fig. 18). The achenes measure about 1·02 × 0·7 mm., and are of a bright yellow colour. Their walls have a total thickness of 0·089 mm. Beneath the pseudo-cuticular coat is a stratum built up of masses of what appear to be very small, completely sclerosed cells, arranged in columnar groups, and which represent the ultimate product of the stratum of small cells immediately external to the internal epidermis of the immature ovary (Plate V, fig. 18). This layer is about 0·03 mm. in thickness. Internal to it is one about 0·056 mm. in thickness, and consisting of the modified internal epidermis. The cell cavities are greatly reduced in size, and are represented by a mere system of curiously ramified, slender channels (Plate V, fig. 18). So complete and uniform has the sclerosis around these been, that the sites corresponding with the original cell-walls are only indicated here and there by the apposition of the somewhat dilated extremities of the fine lateral twigs of the large oblique or vertical channels.

The stigma and the distal portion of the style remain persistent and unaltered, but the basal portion of the latter ultimately undergoes changes parallel to those taking place in the superficial strata of the ovary. As a result of these, the cuticle becomes detached as a sort of tubular diverticulum of the ovarian cuticular sac, and the deeper tissues gelatinise, so that it becomes difficult without special care to procure specimens of the flowers with the styles still adherent.

The mature seeds are somewhat difficult to remove intact from the interior of the achenes, due to the small size and resistent coats of the latter. Soaking in sulphuric acid, however, facilitates the process, as, under the influence of this, the achenes tend to separate more or less completely into two lateral halves and allow the seeds to escape. They are provided with a thin outer coat, consisting of empty flattened cells in several strata, corresponding to those of the secundine and nucellar epidermis of an earlier period of development. Within this are two strata of large cells crowded with oil globules and representing the mature stage of the nucellar parenchyma. The embryo is of relatively large size, and is somewhat curved upon itself, so as to leave a small space on the funicular aspect of the seed-cavity unoccupied, in which apparently a little true endosperm is present. The short radicle is directed to the apex, and the large cotyledons to the base of the seed.

D—Characters of female flowers in mature receptacles which have not been entered by insects.

In the majority of cases the flowers retain the characters of those in receptacles at the stage for the access of insects, or at all events merely show modifications dependent on dessication. That this is so comes out very clearly from the following measurements of a flower at this stage:—

Total height from base of pedicel to summit of ovary	1·368 mm.
Height from base of pedicel to origin of perianth	0·42 mm.
Height from origin of perianth to summit of ovary	0·94 mm.
Height from upper edge of stylar insertion to summit of ovary	0·17 mm.
Breadth of ovary at level of upper edge of stylar insertion	0·42 mm.
Length of style and stigma	1·53 mm.
Diameters of ovule	0·39 × 0·28 mm.

The only index to the occurrence of continued growth in this case lay in the fact that the tips of the lobes of the perianth were somewhat lower in respect to the summit of the ovary than they normally are at the period of insect-access. Otherwise the flower appeared merely to have dried up.

In certain cases, however, as previously mentioned in connection with the characters of the receptacles, general enlargement of the flowers occurs, and certain of them even form achenes. The following are the measurements of a tall achene-bearing flower:—

Total height from base of pedicel to summit of ovary	3·73 mm.
Height from base of pedicel to origin of perianth	1·71 mm.
Height from origin of perianth to bifurcation of fibro-vascular bundle	0·74 mm.
Height thence to base of ovary	0·08 mm.
Height of ovary	1·19 mm.
Breadth of ovary at level of upper edge of stylar insertion	1·08 mm.

It must be noted that this flower was one of those in which the stigma has the abnormal truncate form, and that, as is the rule in such cases, the broadest part of the ovary was not situated at the level of the upper edge of the stylar insertion, but at some distance above it; the style being inserted lower down than in the normal variety of flower.

The achenes in size and outward appearance are precisely like those in receptacles to which insects have gained access, but the outer strata of the ovary are not softened, this being, as already mentioned, probably due to the fact that they have not been macerated by receptacular fluid. On closer examination the resemblance of the achenes to normal ones is found to be only superficial. Even as regards their walls, the degree of sclerosis is very imperfect, the cell-cavities of the internal epidermis remaining relatively large and their lateral branches being proportionately short. It is in their contents, however, that the great difference lies, as these show no traces of an embryo, and consist merely of a great thin-walled empty sac representing the dilated nucellus and secundine. In many cases all the cells in its walls are thin, flattened, greatly extended superficially, and almost or quite empty. In a few instances a feeble attempt at accumulation of albumen has seemingly occurred, the cells corresponding with the nucellar parenchyma showing a certain number of pale globules within them. The development in such cases forms a sort of parallel to the imperfect evolution of the male flowers which, as has been already shown, sometimes occurs in gall receptacles apart from the access of insects.

Results of cultivations of the pollen of Ficus Roxburghii.

A very extensive series of cultivations was carried out, both on the stigmatic surfaces of receptacles ready for insect access, and in suitable fluid media in sealed wax-cells. In the case of the cultivations of the first kind, the receptacles were divided transversely, pollen from mature anthers was smeared over the stigmatic surface of the lower half, the upper half was again fitted on and pressed into close contact, and the receptacle was then placed in a moist chamber. In the other class of cultivations, pollen-grains were immersed in a drop of fluid suspended on the under surface of the cover-glass sealing a wax-cell. The solution which gave the best results was a one per cent. one of cane sugar in water, and with this much more constant and extensive evolution of pollen-tubes occurred than in any cultivations on the stigmatic surface. One great objection to the latter was found to lie in the frequency with which growths of fungal mycelium made their appearance, the filaments having a very marked tendency to adhere to the pollen-grains, and in many cases actually penetrating and passing through them from one end to the other, so that they came to be strung like beads on a thread. Those grains which escaped in many cases germinated, emitting one or two tubes, but the growth always remained very limited. The tubes were very short, and had a great tendency to become dilated at their extremities, after which no further growth occurred (Plate IV, figs. 11, 12). In the case of the cover-glass cultivations there was not so much liability to fungal intrusion, and the tubes grew much more freely. Here they often attained a considerable length, the protoplasm gradually travelling outwards, and frequently leaving the grain at a considerable distance behind as a mere empty shell. Ultimately, as in the stigmatic cultivations, a distal dilatation made its appearance, in which the protoplasm accumulated and from which it was finally discharged into the surrounding fluid (Plate IV, fig. 13). In some cases in stigmatic cultivations, and more frequently in cover-glass ones, a few tubes showed a tendency to branch, but the resulting twigs always remained very short (Plate IV, fig. 13).

Notes on the life-history of the fig-insect affecting Ficus Roxburghii in Calcutta.

In the above heading the words "in Calcutta" have been deliberately introduced, because it remains uncertain whether the insect which is here related to the species is the same as that related to it in its normal habitat, and specific to it, or whether we have not to deal with a case of appropriation of an exotic host by an insect properly related to one of the figs native to the locality. There are some grounds for suspecting that this really is the case. In the first place, it is somewhat hard to imagine how the insects, if specifically related to the tree, were originally introduced to Calcutta. They certainly could not have been normally introduced by the plants first imported, as these were not at a stage to produce any fruit. It is, of course, possible that they may have been imported in receptacles of *F. Roxburghii*, or accidentally along with other materials sent down to the Botanic Garden in Calcutta from the native habitat of the tree; but, as the life of the female insect appears to be very brief after emergence, and as the latter only occurs in detached receptacles when they have been plucked when quite mature, and then very rapidly, there are difficulties in the way of accepting this as a probable event. On the other hand, there are certain phenomena which, at all events, appear to favour the hypothesis of appropriation by insects native to the new locality. For example, during the month of October 1888 specimens of both gall and female receptacles were obtained in the Botanic Garden which had been quite recently entered by insects of the normal species, whilst, in so far as could be ascertained, no mature gall-receptacles had been formed for a period of months on any of the trees there or in the Zoological Garden at Alipore. It appears, then, quite possible that the insect is not specifically related to the tree, but that it is either normally common to it and some other species, or properly belongs to another species, and has appropriated this on importation. Without specimens of the insect normally related to the tree in its native habitat and a complete set of all those affecting the species of figs occurring about Calcutta, neither of which have yet been obtained, it is impossible to come to a definite conclusion on the point, and it is merely alluded to here as one calling for further enquiry.*

Whether, however, the insect be native or exotic, specific to *F. Roxburghii* or common to it and other species, there is no doubt that it is a single species which affects the trees in Calcutta, and is essential to the production of mature pollen and of fertile seeds there, and that this is, as I am informed by Mr. Wood-Mason, a species of *Eupristis*. In dealing with its life-history it is convenient to take as a starting point the period when a large gall-receptacle to which individuals belonging to a previous generation of fertilized females have gained access is attaining the final stages of maturation. The first certain index to the occurrence of these is a softening of the walls of the receptacle, and a diminution in their tension connected with diminution in the supply of sap reaching them and absorption of the receptacular fluid. The walls now give perceptibly on pressure and, at the same time, their colour has changed from green to a reddish-yellow. If such a receptacle be laid open, the interior of the cavity is found merely moist, with a very thick stratum of the enlarged ovaries of the gall-flowers uniformly covering the surface, save over the centre of the ostiolar face, where a great mass of closely-packed filaments and anthers forms a conspicuous prominence. The surface is everywhere, save over the staminal prominence, stained of varying shades of madder-brown, due to deposit from the absorbed receptacular fluid; the depth of tint of various areas being, as previously mentioned, apparently related to the position of the receptacle favouring excessive deposit in some places. Sometimes, too, patches or fine webs of fungal mycelium are recognisable on some parts of the surface. The solid mass of closely appressed ostiolar bracts beneath the mass of over-arching male flowers is of very considerable thickness, even in relatively small receptacles attaining a thickness of near 0·5″.

It is only for a brief period that the mature receptacles retain the above characters, for the insects begin to emerge within a short time. For some time in normal cases male insects alone make their appearance, gnawing their way out of the ovaries and crawling awkwardly about over the surface to perforate the flowers containing the females and to impregnate the inmates. They are amber-coloured, wingless, and with very strong jaws and telescopic abdomens. Gradually more and more of them converge to the central area of the ostiolar face of the cavity and commence to attack the male flowers. With their powerful jaws they cut through filaments and anthers indiscriminately, and soon reduce the mass of male flowers to a mere heap of umber-coloured *débris* and detached stamens, filaments, anthers, and pollen-grains. Having done so, they encounter the much more formidable obstacle presented by the plug of ostiolar bracts. Here they set to work much more methodically, no longer gnawing right and left at random, but confining their operations to the centre of the plug, through which they eventually succeed in tunnelling an evenly cylindrical channel of exit loosely filled with soft brown *débris* and struggling insects (Plate IV, fig. 24).

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* Since the above was written I have, through the kindness of Mr. Gammie, of the Government Cinchona Plantations, obtained a gall-receptacle of *F. Roxburghii* from Sikkim, which, although not quite mature, contained insects in such an advanced stage of development as to enable it to be readily determined that the species present was unequivocally distinct from that affecting the tree in Calcutta.

It is, of course, difficult to determine the precise length of the intervals elapsing between the disappearance of the receptacular fluid and the emergence of the male insects into the cavity, and from the latter to their exit from the perforated ostiolum. They probably vary considerably in different instances, especially the latter, which must necessarily be directly related to the number of male insects present. The following are the only data regarding this point which are attainable:—

1. A mature receptacle was taken in the morning. At noon male insects were beginning to emerge from the ostiolum in large numbers, and at 5 p.m. females were beginning to appear.
2. A large mature receptacle was taken in the morning. A few male insects emerged from the ostiolum during the course of the day and on the following morning, and were then followed by multitudes of females during the course of the forenoon. Here the emergence of the females was apparently delayed, due to the defective number of males present to clear the way for them.
3. A large mature receptacle was taken in the morning. At 4 p.m. one male had actually emerged and others could be seen struggling deep down in the ostiolar tunnel. By 7 a.m. of the following morning numerous males had emerged, and females were emerging and flying off in a continuous stream, and by 9 a.m. emergence had ceased.
4. A mature receptacle was laid open by transverse division, and was found to contain a large number of free female insects and a comparatively small number of males, who were already hard at work demolishing the male flowers and beginning to attack the ostiolar plug. The ostiolar half of the receptacle was put aside under a bell glass with the open surface of the receptacular cavity upwards. Twenty-four hours later perforation of the ostiolar plug had been completed, and a considerable number of male insects had emerged from the orifice and were lying about beneath the under surface of the specimen. As there was no evidence to show that any had escaped over the cut edges of the receptacle, the purely reflex character of the process of tunnelling was strikingly demonstrated.

Having effected their exit, such of the male insects as escape immediate seizure by the predatory ants which are usually on the wait for them fall down from the receptacle and very soon die. Under normal circumstances the winged female insects begin to emerge from the receptacles shortly after the completion of the ostiolar tunnel, appearing for a time in company with the males, and, after these have all emerged, continuing to issue forth alone for a considerable time. But all receptacles are not alike in their insect contents. In normal cases the male insects, although by no means so abundant as the females, are yet present in sufficient numbers to secure rapid and thorough perforation of the ostiolar plug; in others they are still present, but in unduly small numbers, so that there is delay in perforation; and in a third class they are entirely absent. Where no males are present, the females still emerge in enormous numbers from the ovaries into the receptacular cavity, but, as they are incapable of perforating the ostiolar plug, they remain imprisoned, and die without ever gaining exit to the outer world. The same thing also happens when the number of males is extremely reduced and insufficient to secure completion of the tunnel of exit. If such receptacles be laid open ere the death of the inmates, the interior of the cavities presents a most remarkable appearance, the lower part being blackened by a dense mass of struggling females, who at once begin to fly off in clouds into the surrounding air.

When the females emerge by the normal route, they sometimes fly off directly on reaching the external orifice of the tunnel, but they usually remain for a few minutes close to it drying their wings, which are often clogged with moisture, and cleaning of particles of débris which have adhered to them and to the rest of the surface of the body during their outward journey. The amount of adherent *débris* is always insignificant, and appears mainly to consist of the amber-coloured dust of the gnawed stamens and ostiolar scales. No doubt pollen grains are also present, as one or two may occasionally be found still adhering to the corpses of insects in the cavities of freshly-entered receptacles, but the number must always be comparatively small, and is never sufficient to give rise to any appearances recognisable by the unaided eye or under a simple lens.

Very large numbers of the female insects fall immediate victims to the watchful ants which swarm around the mouths of the tunnels, and those who escape soon fly off. Where many large receptacles are emitting simultaneously, a perfect cloud of them fills the surrounding air. The majority of them continue for some time hovering about in the neighbourhood of the site of exit, and then, where receptacles suitable for the purpose are present, they settle down and attempt to gain access to the cavities. They are, however, capable of flying for a considerable distance, for the only female tree of *F. Roxburghii* in the Botanic Garden in Calcutta is situated at a distance of about a quarter of a mile from the nearest male ones, and yet crops of figs to which female insects have attained access are constantly present on it. The insects have a certain power of discriminating receptacles which are at the suitable stage for them from those which have either not attained to or have exceeded it. The distinctive feature would seem to lie in some condition of the ostiolar bracts, as insects may often be seen alighting on the surfaces of apparently suitable receptacles, running eagerly over them up to the ostiolar area, entering its concavity, and, after scrutinising it, emerging again and flying off in search of another fig. While this is the case, they are at the same time incapable of distinguishing gall from female receptacles, and struggle as energetically to enter the latter as the former. When once they have found a suitable one, they at once set about the arduous task of forcing their way in through the solid ostiolar plug of closely appressed, overlapping, sticky bracts, which in gall-receptacles has a thickness of about 0·3″, and in female ones is usually somewhat thicker, measuring in many cases as much as 0·43″. The relative sizes of insect and ostiolar plug are shown in Plate III, fig 1.

Where insects are present in abundance, the ostiolar depressions of suitable receptacles frequently become crowded by masses of struggling visitors attempting to force their way down between the bracts, and casting their wings as they do so. They gradually disappear from view, and a certain proportion of them ultimately succeeds in gaining access to the receptacular cavity. Large numbers of them, however, never do so, but perish miserably between the sticky bracts, where their bodies remain readily recognisable for months—even up to the period of maturation of the receptacles—as dark brown or black strata sandwiched between the appressed surfaces of the bracts. The number of insects who eventually attain access to the cavity varies greatly in different instances, but, allowing for this, there can be no doubt that larger numbers effect entrance to gall receptacles than is ever the case with female ones. The following are the data regarding this point as recorded of a certain number of cases in which the point was specially investigated :—

1. Four young gall-receptacles were opened shortly after a large emergence of insects had taken place from mature ones on the same tree. In all of them the corpses of insects were present packed away among the ostiolar bracts; in two no insects had gained access to the cavity; in one a single insect had gained access, but the cavity was still dry; in one twenty insects had entered, the cavity contained some fluid, the ovaries were evidently enlarged, and on microscopic examination unsegmented, pedicellate ova were found within the nucelli.
2. A gall-receptacle opened and found to contain the corpses of twenty-four insects, but no fluid.
3. A female receptacle opened fifteen days after insects had been seen to enter the ostiole. Ten corpses of insects present in the cavity, the ovaries enlarged, but no fluid yet present.
4. Five female receptacles opened. All showed evident general ovarian enlargement. One contained a single insect; one four; two five; and one nine.
5. Four female receptacles with general enlargement of the ovaries opened. All of them contained several insects.
6. A female receptacle with general enlargement of the ovaries contained four insects.
7. A female receptacle full of fluid and containing about 7,000 enlarged ovaries, including well-developed embryos, showed two insect corpses.
8. A female receptacle with about 12,700 enlarged ovaries, including embryos, contained only one insect-corpse within the cavity.
9. A female receptacle with universal ovarian enlargement contained a single insect.
10. Six female receptacles with general ovarian enlargement opened. Two contained one insect; three two; and one twenty-two.
11. One nearly mature female receptacle with general enlargement of the ovaries contained three insects with one or two shrunken pollen-grains adherent to them.
12. A female receptacle with general ovarian enlargement contained one insect.
13. A female receptacle full of fluid and with general ovarian enlargement contained four insects.
14. A mature female receptacle full of normal achenes contained one insect embedded in the gelatinous coating resulting from the softening of the outer coats of the ovaries.

The above data show clearly that in the case of the female receptacles the results following access of insects are not proportionate to the numbers actually attaining entrance, and that the entrance of a single insect is sufficient to determine general ovarian enlargement and the development of thousands of embryos. The latter fact has been brought out very clearly in certain special cases. In the first of these a receptacle into which a single insect had gained access was used as the source whence materials for sections and dissections of the ovaries at an early stage of enlargement were obtained, and in all cases embryos in the earlier stages of evolution were readily recognisable; in the second over eleven thousand achenes from a mature receptacle containing only one recognisable insect were sown and yielded an enormous crop of seedlings.

Those insects which succeed in forcing their way into the receptacular cavities immediately set about attempting to deposit their ova within the flowers. They move actively about over the surface from one flower to another, and in the case of gall-receptacles rapidly get rid of their ova, and then die. The site of deposition is invariably within the nucellus between the epidermis and the loose parenchyma, and at a level with, or a little beneath, the site of attachment of the funicle, and therefore at some distance beneath the level of attachment of the base of the style (Plate IV, figs. 14, 16). The deposition must apparently take place, not *viâ* the style, but by means of penetration of the upper surface of the ovary. The external ovipositor is certainly too short to reach even the base of the style in many cases, but, without definite information regarding the length to which the internal portion can be protruded beyond it, this cannot be regarded as evidence of any great weight in regard to the question. The really important evidence lies in the structural features of the flower, as these show that a very much more direct route to the site of deposition is present from the summit of the ovary than from the stigma, and one, too, in which the amount of solid tissue to be penetrated is very much less than in the case of the stylar route. This is shown very clearly by the following measurements:—

1. Distance from superior surface of ovary to site of deposition—

Thickness of ovarian wall	0·04 mm.
Depth from internal surface of ovarian wall to micropyle, which lies immediately below	0·02 mm.
Depth from micropyle to level where the secundine becomes closely adherent to the nucellus	0 06 mm.
Depth thence to site of deposition	0·04
Total depth from surface of summit of ovary to site of deposition	0·16
Depth of really solid tissue to be penetrated	0 08

2. Distance from inferior extremity of stylar canal to site of deposition—

Depth of solid portion of style from lower end of stylar canal to inner side of inner stratum of ovarian wall	0·16 mm.
Depth thence to site of deposit	0·08 mm.
Total depth of solid tissue to be penetrated	0 24

It is evident from the above figures that the stylar route reckoned from the lower extremity of the stylar canal is one-third longer than the other one, and includes three times as large an amount of solid tissue as it does (Plate IV, fig. 19). It is, moreover, much more indirect, as will be clearly evident on reference to the drawing, for the upper surface of the ovary lies vertically over the micropyle and the site of deposition within the nucellus, whilst the lower end of the stylar canal is situated far to one side of the latter. It does not thus appear to be the different form of the stigma and style in normal female and gall-flowers, which permits of the deposition of ova in the latter and prevents it in the former. The real determinant is, no doubt, the very great difference in the character and thickness of the ovarian walls in the two cases. Over the summit of the ovary in gall-flowers the wall is only about a third as thick as it is in the corresponding site in female ones (Plate V, figs. 1, 22), and it is throughout composed of thin-walled cells which may readily be penetrated, whereas in the case of the female flowers the outer and inner epidermal cells have relatively strong walls, and there is, in addition, a stratum of very dense tissue consisting of the layer of small cells immediately external to the internal epidermis.

The ova as expressed from the bodies of the insects and as occurring within the nucelli of recently-entered receptacles vary conspicuously in characters. As obtained from the bodies of the insects, they are more or less spherical with diameters of between 0·05 and 0·06 mm., a conspicuous nucleus and beautifully reticulate protoplasm (Plate IV, fig. 18), whereas within the nucelli they are of elongated oval form, contain a dense solid mass of protoplasm concealing the nucleus, and are provided with a long pedicel which serves to attach them to the neighbouring tissues (Plate IV, fig. 17).

Although no ova can be deposited within the true female flowers, the insects which mistakenly enter female in place of gall-receptacles do not appear to realise the fact, and go on perseveringly traversing the surface and attempting to effect perforation until they become exhausted and die, their corpses remaining readily recognisable for a long time, and their heads, especially, remaining well preserved even to the time of maturation of the receptacles.

Other insects especially related to the receptacles of F. Roxburghii.

No other insects, of course, are so essentially related to the receptacles as the species described above, but there are several others which are closely associated with them. The first of these, which is probably a species of the Tineina according to Mr. Wood-Mason, inhabits the receptacular cavities during its larval stage, feeding on the flowers, and ultimately eating its way out through the ostiolum. The affected receptacles never mature, but fall soon after the emergence of the insect, and the number of them which are thus aborted is very considerable, especially in the case of female trees. Three species of ants are also specially related to the receptacles. These are, 1st, a small, brown, hairy species, which Mr. Wood-Mason informs me is probably *Pheidole indica*, Mayr.; 2nd, *Œcophylla smaragdina*, Fabr.; and 3rd, *Sima rufonigra*, Jerdon. The first species utilizes the mature female receptacles as formicaries. There is no conspicuous perforation or other external sign to indicate their presence, but on opening an affected receptacle the cavity is found to be occupied by a small colony of the mature insects with an abundance of young ones in various stages of development spread out over the gelatinous surface. On one occasion an affected receptacle after division was kept for some days under observation. The young were very soon carried down out of sight into cavities in the pulp, and the mature insects made excursions out over the table to pick up any scattered ones and carry them home. The association of *Œcophylla smaragdina* with the receptacles is due to the fact that the fig-insect serves as a great source of food-supply. As has been already pointed out, the occurrence of maturation in the gall-receptacles and the approaching exit of the fig-insects can very frequently be readily detected for some time ere emergence actually sets in, due to the presence of parties of this species of ant watching vigilantly around the ostioles and fiercely resenting any handling of the receptacles As it appears to be impossible that they should be able to appreciate the diminished tension of the thick receptacular walls consequent on the disappearance of the fluid from the cavity during maturation, it is probable that they ascertain the approaching exit of the fig-insects by hearing the gnawing of the males among the ostiolar scales, or by tactile sensation of the vibration of tissue connected with it. In any case they are there in waiting, and, as soon as the fig-insects begin to emerge, at once proceed to seize and carry them off, peering down into the canal of exit and often reaching down into it to secure insects which have not yet fairly emerged. So long as the number of maturing receptacles is not excessive in relation to the number of ants present, the latter are contented to carry off their prey to their nests on other trees; for, under ordinary circumstances, there are none on *F. Roxburghii*, due, no doubt, partly to the inconvenient strength and resistance presented by the leaves rendering them difficult to manipulate, but mainly to the fact that the tree is not liable to be infested by aphides or scale-insects, the presence of which is the ordinary determinant of the location of the nests. The nests, during a great part of the year at all events, are mere cow-houses, and it is only during the rainy season that young are to be found in them. When, however, an excess of receptacles mature simultaneously, the ants construct nests locally, managing in a wonderful fashion to bend the large, stiff leaves and secure their edges by the usual tough, papery web used in nest building elsewhere, and proceed to accumulate large numbers of corpses in these local larders.

Sima rufonigra also utilises the fig-insects as a source of food-supply, but is not nearly so constant or methodical in its attendance as the previous species is, due, no doubt, to the great abundance of the latter, and the ferocity with which any interference with its rights is resented. In fact, as a rule, ants of this species are only found on trees not visited by *Œcophylla*, or only after the latter has left the receptacles on the cessation of emergence of fig-insects from them. In the latter case they frequently enter the receptacular cavity to pick up the bodies of insects which have died without emerging.

Conclusion.

It remains now to consider certain points regarding the relation which the presence of the fig-insect holds to the fertilization of the receptacles of *F. Roxburghii*. There can be little room for doubt that the phenomena indicate that, while the development of embryos in the female receptacles of the tree is essentially connected with the access of the insects to the receptacular cavity, it is yet normally independent of the introduction of pollen by their agency. The fact that the access of a single insect or of a pair of them only is sufficient to determine the development of ten or twelve thousand embryos, is in itself almost conclusive against the occurrence of any ordinary process of pollination. The obstacles through which a passage has to be forced ere the receptacular cavity is reached are of such nature and amount as to render it almost inconceivable that pollen should be introduced in sufficient quantity (Plate III, figs. 1, 2), and there is at the same time an absolute want of evidence to show that such introduction takes place. I have carefully examined very many receptacles at various periods shortly after access of insects to the cavities, and have never been able to detect any evidence of general distribution of pollen over the stigmatic surface. Examination of individual flowers has given like results; in most cases it has been impossible to find any pollen within the receptacle or cavity, and in the few cases in which any was found it was represented by one or two shrivelled grains adherent to the corpses of insects. It must be borne in mind, too, that if we accept the hypothesis that the development of the embryos is due to ordinary processes of pollination, we must assume not only that a single insect can convey many thousands of pollen-grains with it in spite of the excessive obstructions to access presented by the ostiolar plug, but that these grains are also most methodically and economically distributed, for, unless each stigma were only allowed to appropriate a single grain, the amount introduced would have to be indefinitely multiplied.

The occurrence of ordinary pollination thus appears to be impossible, and the only way in which a sufficient number of pollen-tubes could be reasonably supposed to originate would be by means of peculiarities in their development, the primary tubes originating from the grains having a capacity for indefinite growth and ramification, so as to give rise to mycelioid expansions from which branches might be distributed to the individual stigmata. There is, however, no evidence of the actual occurrence of any such phenomenon. There is nothing to show that the tubes, whether developed within the receptacular cavities or as the result of artificial cultivations in suitable media, have any special tendency to branch, far less that they have any capacity for indefinite mycelioid extension.

The most important evidence against the occurrence of pollination of any sort as a normal and essential event lies, however, in the fact that the embryo originates, as it does in undoubted cases of development, apart from pollination. The embryo, as a rule—for of course it is possible that pollination and normal evolution may occur in certain individual flowers—certainly arises as an outgrowth of the nucellar parenchyma outside the embryo-sac, and not as the result of special evolution of any elements contained within the latter. The embryo-sac up to the period of insect-access and of initial development of the embryo normally retains the characters of a simple, uninucleate cell. There is no evidence of the formation of an oosphere, of synergidæ, or of antipodal cells within it, and it is only subsequent to commencing evolution of the embryo that the primary nucleus is replaced by a large number of secondary ones which are apparently related to the elaboration of food material for the growing embryo when it gains access to the cavity of the sac.

But if this be so, if pollination be unnecessary, why should the access of insects be essential to the development of embryos? The phenomena presenting themselves in connection with the male flowers of gall-receptacles appear to afford a clue to answering this question. It is just as impossible for the male flowers to come to perfection—just as impossible for perfect pollen-grains to be developed without the access of insects to the gall-receptacles—as it is for embryos to be developed in female ones under parallel circumstances. In the case of the male flowers, however, it is clear that the introduction of pollen into the receptacular cavity cannot be the essential determinant of development, but that this must be related to something else connected with the access of the insects. It is not anything directly introduced by the insects that determines the perfect evolution of the male flowers, but it is due to effects which their entrance produces on the receptacle that the evolution becomes possible. The result of the access of the insects, of their puncture of the gall-flowers and deposition of ova in the interior of the nucelli, is the induction of great irritative stimulation to the activities of all the tissues of the receptacle. The entire mass of the receptacular tissues undergoes hypertrophic changes similar to those occurring in the development of any common gall-growth, and connected with their occurrence an enormously increased flow of sap to the receptacle takes place, as indicated by the accumulation of fluid under high pressure within the receptacular cavity, and the abundant escape of latex on division of the peduncle or incision of the surface.

The maturation of the male flowers is, then, clearly a result of general irritative hypertrophy of the receptacular tissue as a whole, due to insect access, and not the result of the addition of any extraneous bodies to them: and when the rest of the evidence is taken into account, there can be little doubt that the phenomena presenting themselves in connection with the true female flowers are of essentially similar nature and origin.

It may be objected that in the case of the female receptacles no deposit of ova within the tissues takes place, and that, therefore, a source of irritative stimulation of sufficient magnitude is wanting. But although no ova are successfully deposited within the ovaries of the true female flowers, owing to the strength and thickness of their walls, this by no means implies that attempts at deposit are not made. On the contrary, as has already been pointed out, the insects which attain access to female receptacles go on perseveringly attempting deposition until they are worn out and die; or, in other words, they go on perseveringly stinging the ovarian tissues as long as their life lasts. But it is the process of perforation, which is probably the real determinant of hypertrophy in the gall-receptacles, and not the mere deposition of the ova, which profit by its presence. The essential stimulus is thus alike in both cases; and this being so, parallel results naturally follow, and maturation of pollen-grains in the male flowers and embryogenic growth of a specialised portion of the nucellar tissue in the female ones take place.

While this is so; while the development of embryos as a rule occurs independently of pollination, it is of course possible that exceptions may occur, and that the embryogeny of certain flowers may take place in the normal fashion; and it is even possible that the embryos arising in this way may have a stronger vitality, and therefore more chance of ultimate survival, than the others: but if this be the case, it can only be so as an exceptional phenomenon, for among the hundreds of ovules which I have examined I have never seen anything suggestive of its occurrence.

The development of embryos in *F. Roxburghii*, then, appears normally to be an asexual process dependent on hypertrophic budding of a specialised portion of the nucellar parenchyma, and it appears not improbable that the phenomenon is not peculiar to the species, but is the rule in the case of other figs also. This, of course, requires further investigation; but in the only instance in which I have yet had time to examine the matter—in the case of *F. hispida*—there can be no doubt that it is so.

In conclusion, I have to express my obligations to my friends Dr. George King and Dr. Gerald Bomford: to the former for having first directed my attention to, and supplied me with materials for the investigation of the subject dealt with in the previous pages, and to the latter for a very fine set of serial sections of ovules from receptacles before and after insect access.

D. D. CUNNINGHAM.

November 1888.

DESCRIPTION OF PLATES.

PLATE I.

Fig. 1. Mature galled male receptacles. Almost natural size.
Fig. 2. Ditto ditto ditto; one divided and showing the receptacular cavity.

PLATE II.

Fig. 1. Mature male flower, showing sheathing bract, bilobed outer perianth, inner perianth ruptured superiorly, stamens, and rudimentary female organs . . . . × 10·5
Fig. 2. Pedicellate gall-flowers from a receptacle ready for insects . . . . × 37
Fig. 3. Pedicellate gall-flowers containing insects from an almost mature receptacle . . . . . × 37
Fig. 4. Sessile gall-flower from a receptacle ready for insects . . . . × 42
Fig. 5. True female flowers from a receptacle ready for insects . . . . × 25
Fig 6. Pedicellate female flower stained with picrocarmine from a receptacle ready for insects, showing perianth, division of axial fibro-vascular bundle, funicle, and ovule . . . × 42
Fig. 7. Mature female flowers containing ripe achenes . . . . × 25

N.B.—Figs. 4 and 6 are from permanently mounted covered specimens; figs. 1, 2, 3, 5, and 7 from fresh uncovered ones.

PLATE III.

Fig. 1. Vertical section through the ostiole of a female receptacle ready for insects, showing the thickness of the solid plug of overlapping ostiolar bracts and the relative size of the female fig-insect . . . . × 10·5
Fig. 2. Vertical section of a female receptacle ready for insects. Natural size.
Fig. 3. Transverse section of a female receptacle in which a certain number of the ovaries have become enlarged independent of access of insects. Natural size.
Fig. 4. Flowers and part of the receptacular wall of a mature female receptacle . . . . . . × 10·5
Fig. 5. Ditto ditto ditto female receptacle ready for insects . . . × 10·5
Fig. 6. Mature female receptacle. Natural size.
Fig. 7. Transverse section of a mature female receptacle. Natural size.

PLATE IV.

Fig. 1. Male flowers: *a*, nearly mature, inner perianth divided and reflected to show position of stamens and rudimentary female organs; *b*, position of stamens in a fully mature flower.
Fig. 2. Upper part of nearly mature male flower with naturally ruptured inner perianth still surrounding the folded filaments . . . . × 25

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Fig. 3. Highly developed rudimentary female apparatus of a male flower . . . . × 25

Fig. 4. State of stamens in the male flowers of mature receptacles to which insects have not gained access, but in which a certain amount of evolution has occurred beyond the stage present at the normal period for access, showing a certain amount of development of the anther-lobes.

Fig. 5. Transverse section through an anther-lobe of such a stamen, showing masses of pollen-tetrads, tapetal cells, and stratum of fibres . . . . × 119

Fig. 6. Isolated pollen-tetrads from such a stamen . . . . × 690

Fig. 7. Mature pollen-grains stained with picrocarmine, showing nuclei . . . . × 690

Fig. 8. Sheathing bract of a male flower at period for access of insects to the receptacle.

Fig. 9. Mature pollen-grain, fresh . . . . × 850

Fig. 10. Various appearances presented by pollen-grains in one per cent. solution of cane sugar . × 850

Fig. 11. Germinating pollen-grains from cultivations on the stigmatic surfaces of receptacles . . × 690

Fig. 12. Ditto ditto ditto ditto . . × 500

Fig. 13. Germinating pollen-grains from one per cent solution of cane sugar . . . . × 690

Fig. 14. Ovule of a gall-flower from a receptacle shortly after access of insects, showing intranucellar site of insect ovum ; stained with picrocarmine . . . . × 42

Fig. 15. Apex of similar ovule, showing tendency to formation of an apical cap in the nucellar parenchyma . . . . × 119

Fig. 16. Portion of a similar ovule, showing site of insect ovum between nucellar epidermis and parenchyma . . . . × 119

Fig. 17. Insect ovum, and portion of nucellar parenchyma from a similar ovule . . . . × 370

Fig. 18. Ovum as expressed from the body of a female insect . . . . × 370

Fig. 19. Vertical section through a gall-flower from a receptacle ready for the access of insects . × 119
c.s, stylar canal ; p, solid base of style ; o, wall of ovary ; f.v, branches of axial fibro-vascular bundle ; s, secundine ; e.n, nucellar epidermis ; i.n, nucellar parenchyma ; ó, site of deposit of ovum.

Fig. 20. Inner stratum of cells of membrane surrounding the body of an embryo insect within the ovary of a gall-flower . . . . × 370

Fig. 21. Section of gall-receptacle ready for insects. Natural size.

Fig. 22. Ditto ditto ditto.
a.a, area occupied by male flowers ; b, area occupied by ostiolar bracts; c, c, area of gall-flowers.

Fig. 23. Section of gall-receptacle which had matured without access of insects. Natural size.

Fig. 24. Portion of a mature galled receptacle after escape of the fig-insects, showing tunnel through ostiolar plug.

Fig. 25. Section of ovarian wall from an almost mature gall-flower containing an insect . . . × 370

Fig. 26. Portion of a mature ungalled gall-receptacle showing thickness of stratum of gall-flowers. Natural size.

Fig. 27. Portion of a mature galled receptacle, showing tiers of ovaries and uneven receptacular surface.

PLATE V.

Fig. 1. Vertical section through the apex of the ovary of a true female flower from a female receptacle ready for the access of fig-insects, showing the different strata of the ovarian wall, the secundine, the nucellar epidermis, and its apical thickening in the micropyle, the nucellar parenchyma with its apical thickening and embryogenic cell, and the upper part of the embryo-sac ; stained with logwood . . . . × 370

Fig. 2. Portion of vertical section of the apex of the ovary of another flower at the same stage, showing a portion of the apical cap of nucellar parenchyma, the embryogenic cell, and apex of the embryo-sac . . . . × 690

Fig. 3. Portion of the next serial section of the same ovary as that of figure 2, showing apical cap of nucellar parenchyma, embryogenic cell, and embryo-sac, with its nucleus . . . . . × 370

Fig. 4. Portion of another ovary . . . . . × 690

Fig. 5. Ditto ditto . . . . . × 370

Fig. 6. Ditto ditto showing attachment of embryogenic cell to the under surface of the apical cap of nucellar parenchyma.

Fig. 7. Portion of the base of an ovary, showing basal thickenings of nucellar epidermis and parenchyma from a female flower in a receptacle ready for insects . . . . . × 370

Fig. 8. Ovule from a female flower of a receptacle ready for insects, showing raphe, secundine, and nucellar epidermis and parenchyma, with basal and apical thickenings; stained with picrocarmine . . . . . × 42

Fig. 9. Ovule from a female flower in a receptacle to which fig-insects had recently gained access, showing development of the embryogenic cell and the presence of secundary nuclei in the embryo-sac . . . . . × 119

Fig. 10. Embryo-sac and embryogenic cell of the same ovule . . . . . × 370

Fig. 11. Embryogenic cell and portion ef apical cap of nucellar parenchyma, showing initial stage of evolution of the embryogenic cell subsequent to the access of insects to the receptacle . . . . . × 690

Fig. 12. Commencing evolution of the pro-embryo within the enlarged embryogenic cell . . . × 690

Fig. 13. Upper part of the embryo-sac of a flower from a receptacle shortly after access of insects, showing the mark on the apex of the sac corresponding with the under surface of the enlarging embryogenic cell; also the persistent primary nucleus . . . . . × 370

Fig. 14. Portion of vertical section of the apex of the ovary of a female flower from a receptacle shortly after the access of insects, showing the pro-embryo and the embryogenic cell, with its processes, and its attachment to the under surface of the apical cap of nucellar parenchyma; stained with logwood. . . . . . × 370

Fig. 15. Ditto ditto ditto ditto . . . . . × 690

Fig. 16. Portion of vertical section of the base of au ovary of a female flower from a receptacle shortly after access of insects, showing peculiar outgrowth of nucellar parenchyma . × 370

Fig. 17. Vertical section through ovarian wall of a true female flower from a receptacle ready for insects; stained with picrocarmine . . . . . × 370

Fig. 18. Vertical section through the wall of a ripe achene; stained with gentian violet . . . × 370

Fig. 19. External epidermis of ovary of a mature female flower . . . . . × 370

Fig. 20. Hypodermal cells of ovary of mature female flower; stained with gentian violet . . . × 160

Fig. 21. Portion of vertical section of the base of an ovule of a female flower from a receptacle shortly after access of insects; stained with picrocarmine . . . . . × 370

Fig. 22. Vertical section through the ovarian wall of a gall-flower from a receptacle ready for insects . . . . . × 370

W. H. D'C.– Reg. No. 11921J—350—27-4-89.

INDEX TO APPENDIX.

	PAGE.
COVELLIA	6
EUSYCE	8
FICUS Armiti, *King*	6
,, Baeurleni, *King*	8
,, Bernaysii, *King*	7
,, casearioides, *King*	5
,, Chalmersii, *King*	6
,, Edelfeltii, *King*	4
,, hesperidiiformis, *King*	3
FICUS Lawesii, *King*	4
,, Pantoniana, *King*	8
,, rhizophoræphylla, *King*	9
,, Roxburghii, *Wall.*	13
,, Scratchleyana, *King*	5
SYCIDIUM	6
SYNŒCIA	4
UROSTIGMA	2

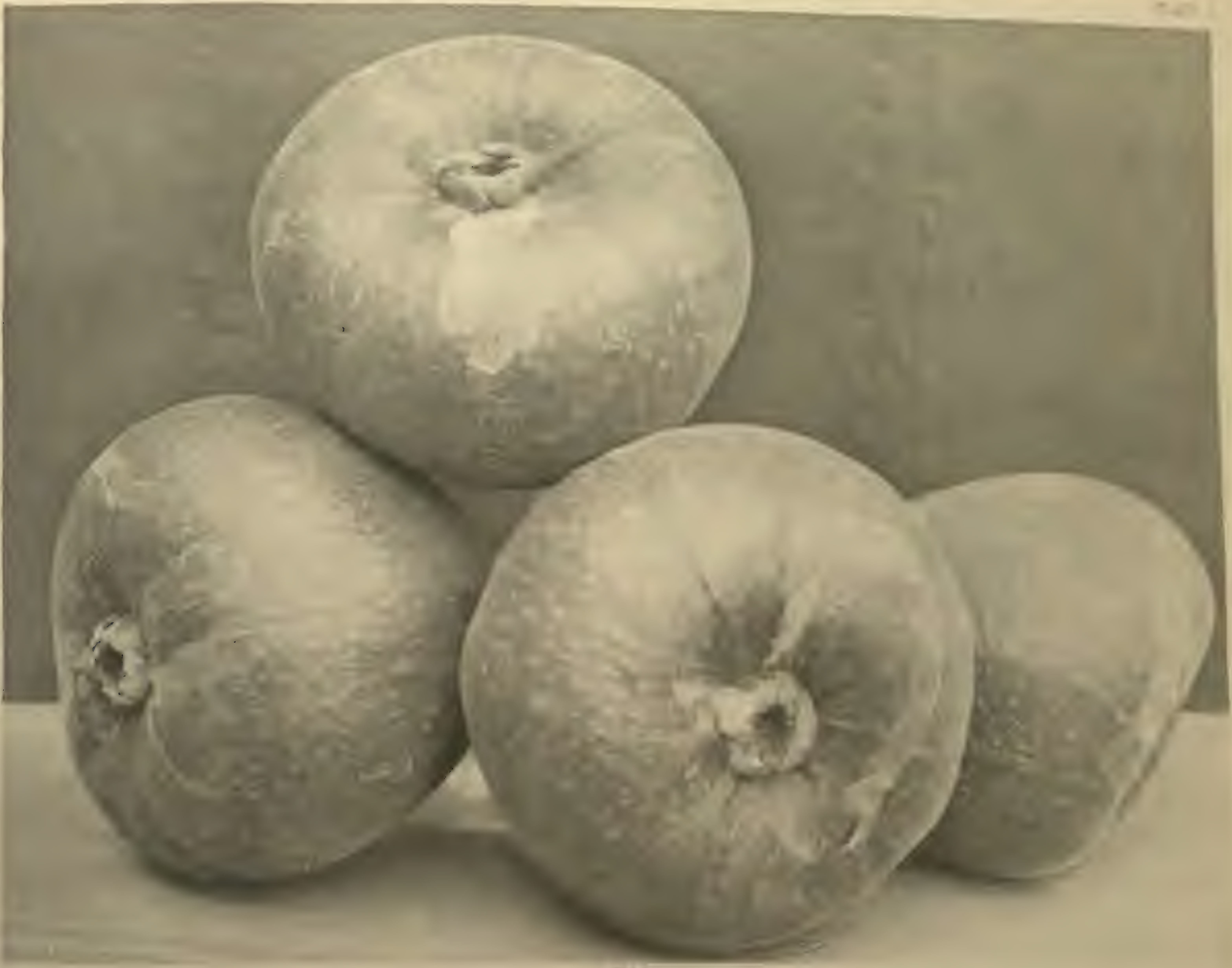

Fig. 1

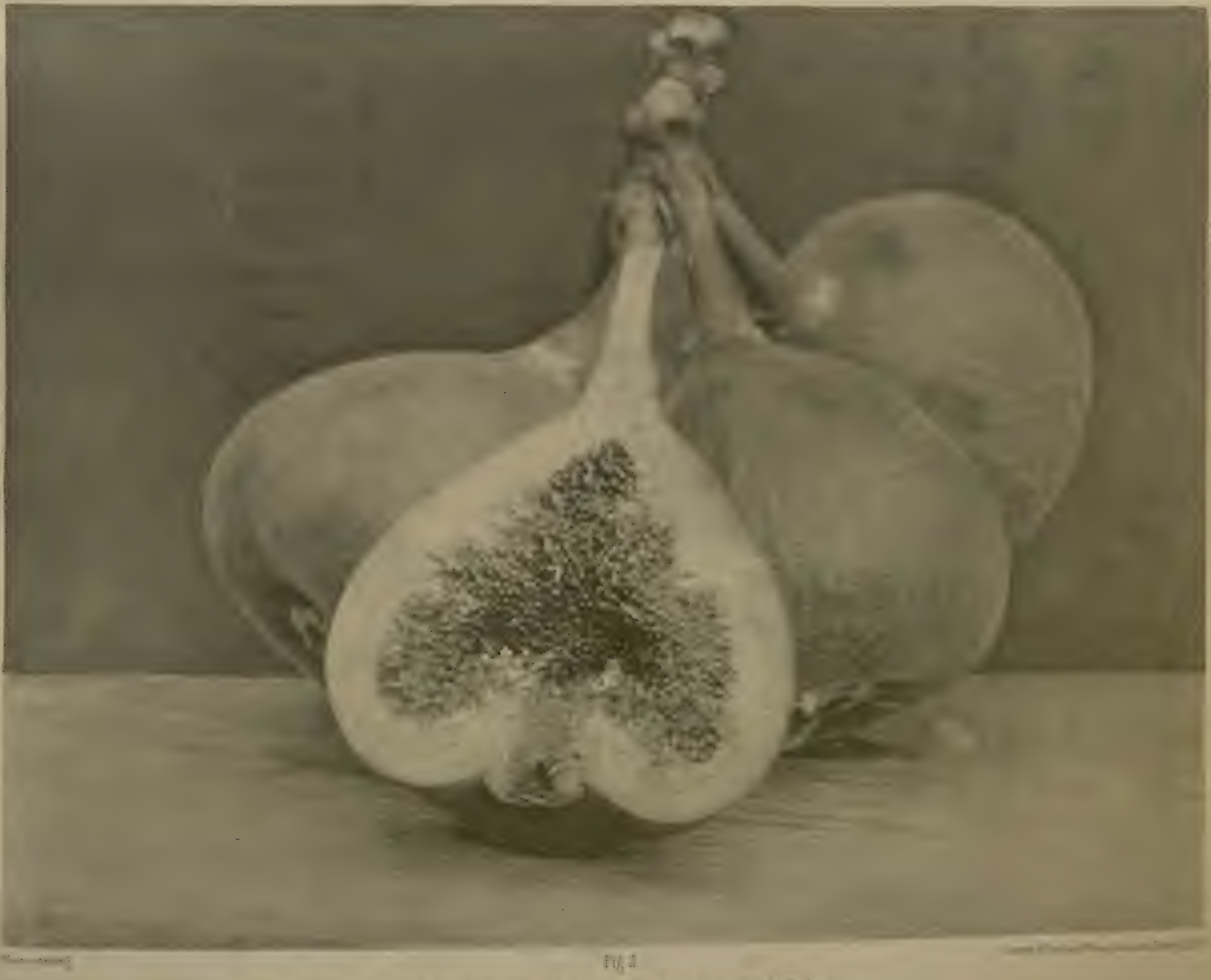

Fig. 2

FICUS ROXBURGHII, WALL.

Mature Edible Male Receptacles

PLATE II.

Fig. 5 × 25.
Fig. 2 × 37.
Fig. 6 × 42.
Fig. 7 × 25.
Fig. 4. × 25.
Fig. 1. × 10·5.
Fig. 3 × 37.

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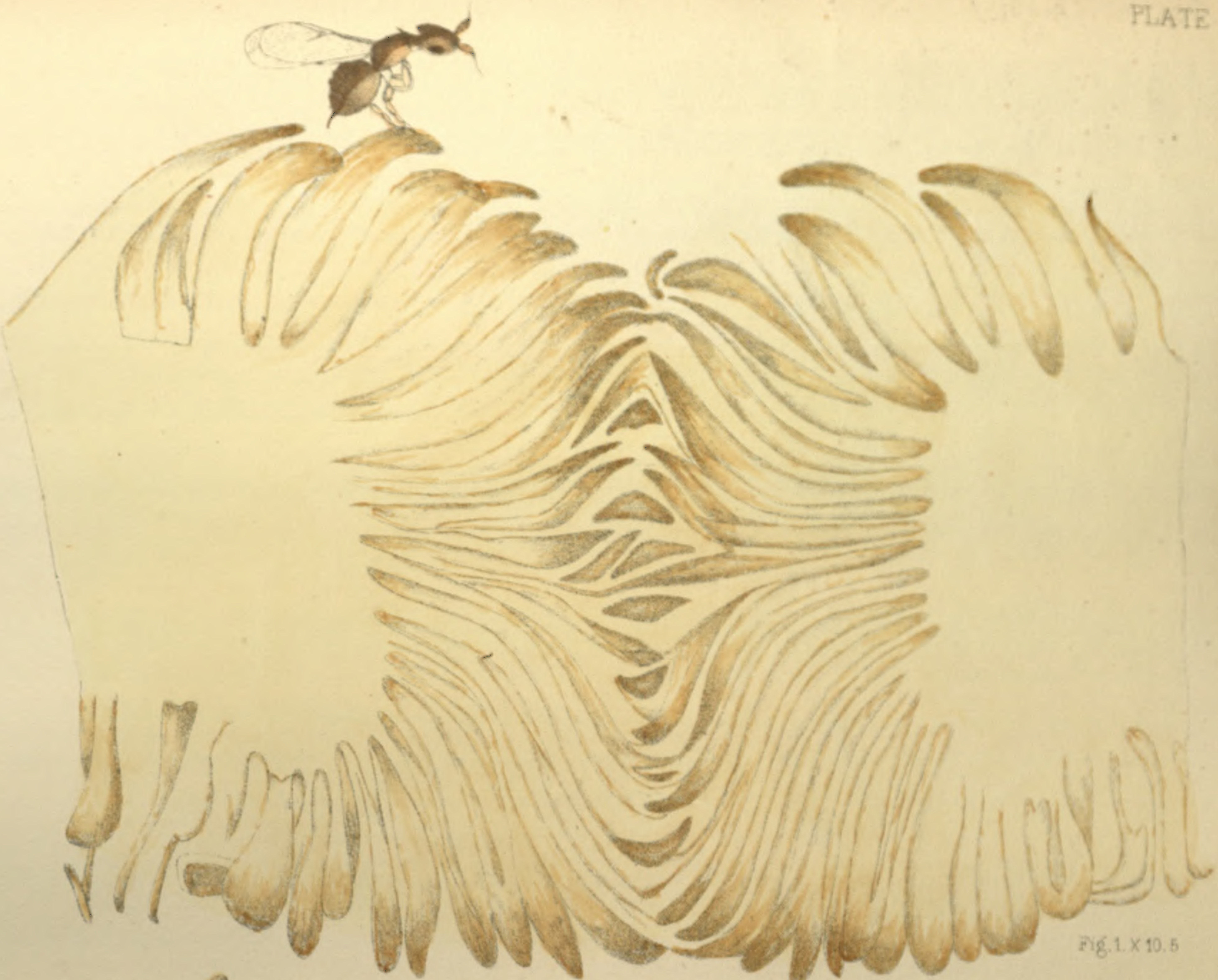


Fig. 1. × 10.5

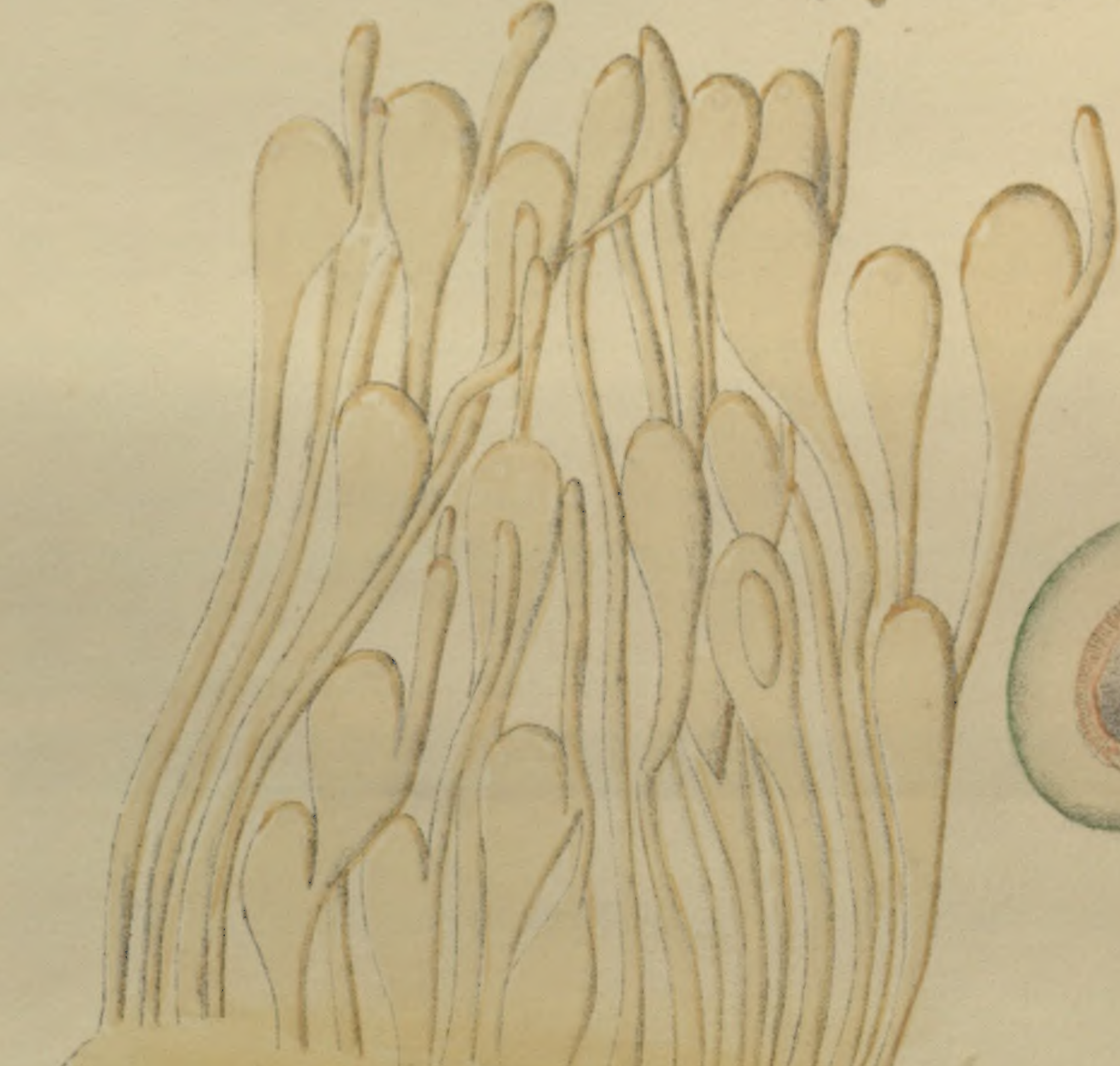


Fig. 4. × 10.5.

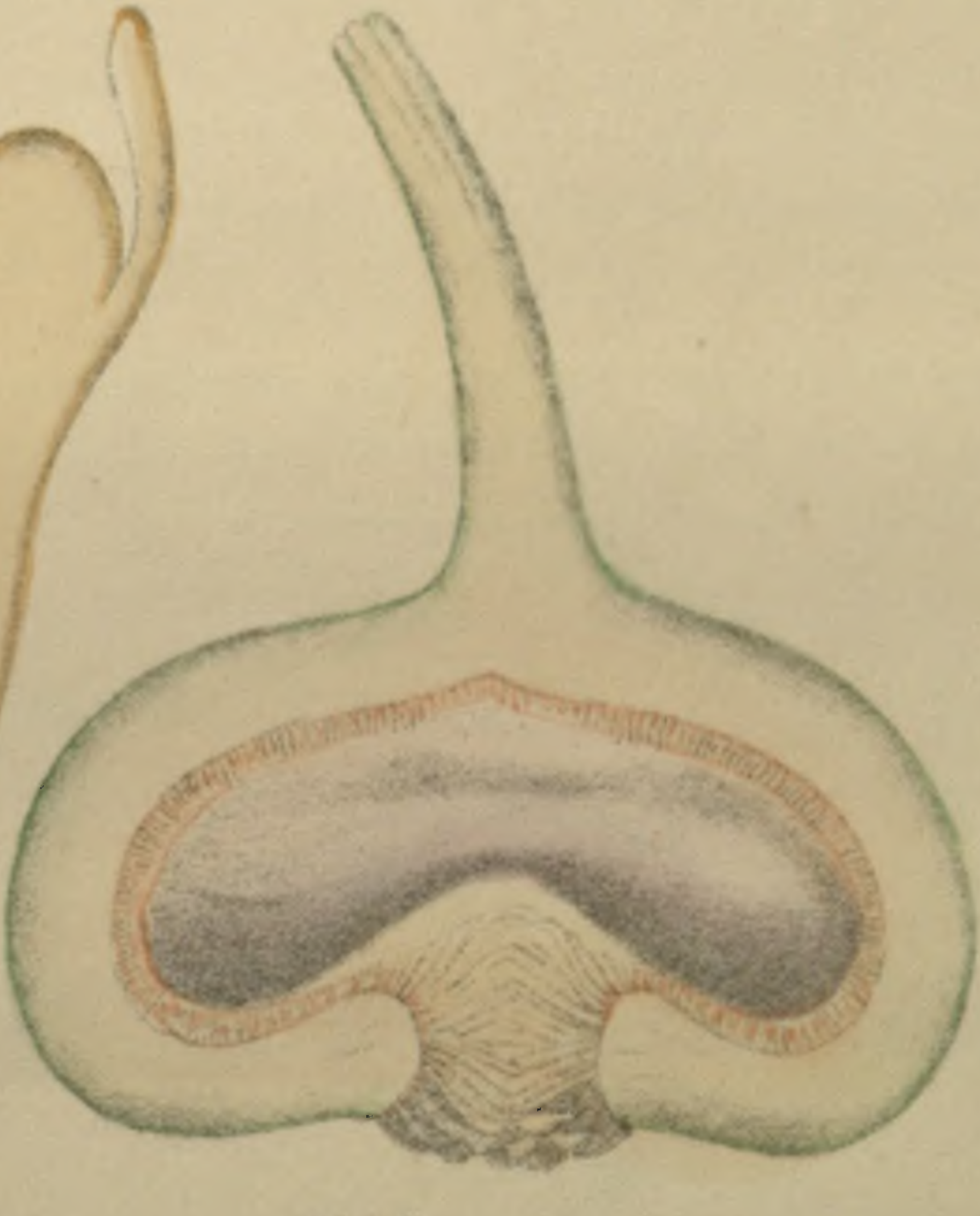


Fig. 2.

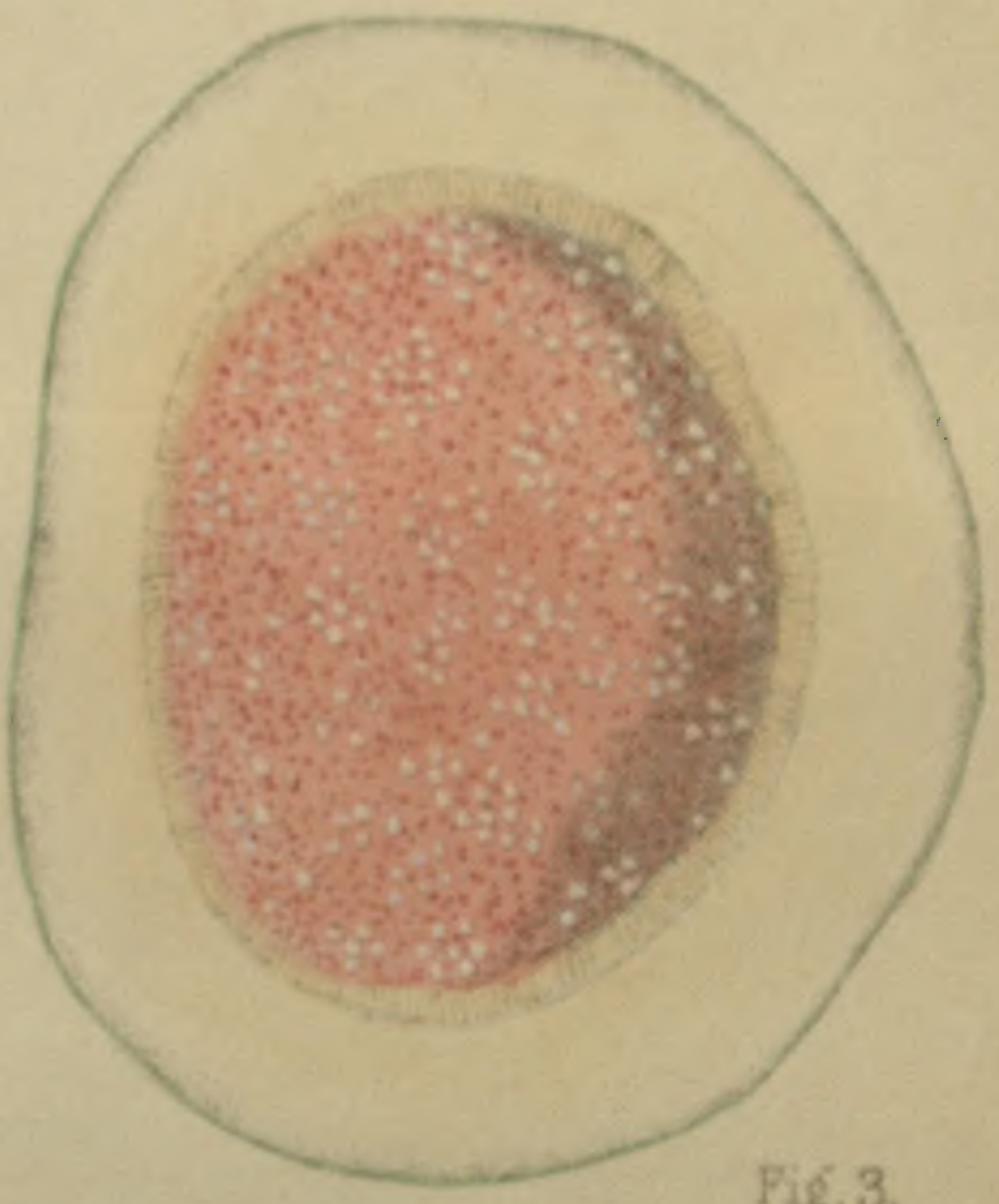
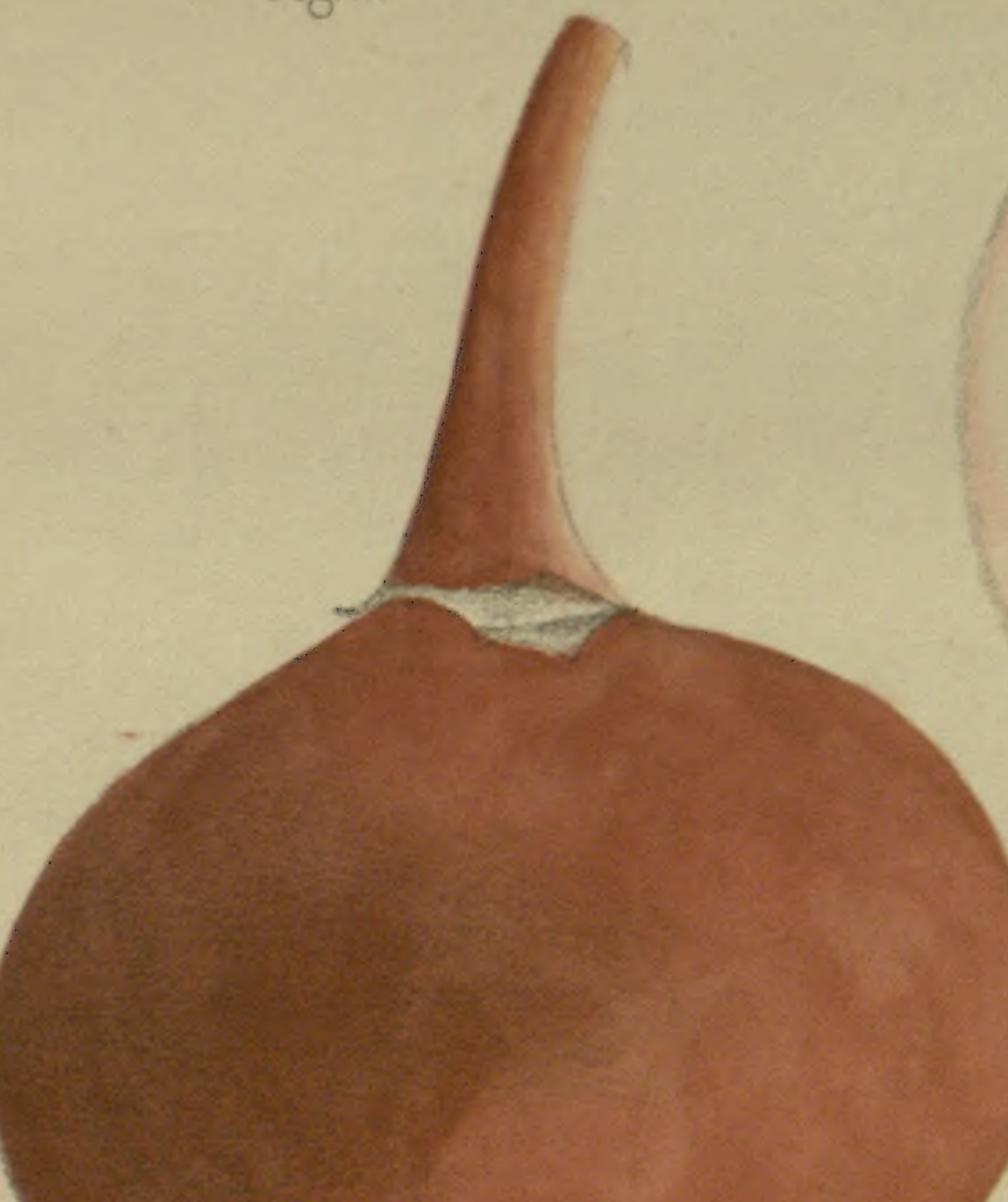


Fig. 3.

Fig. 5. × 10.5.



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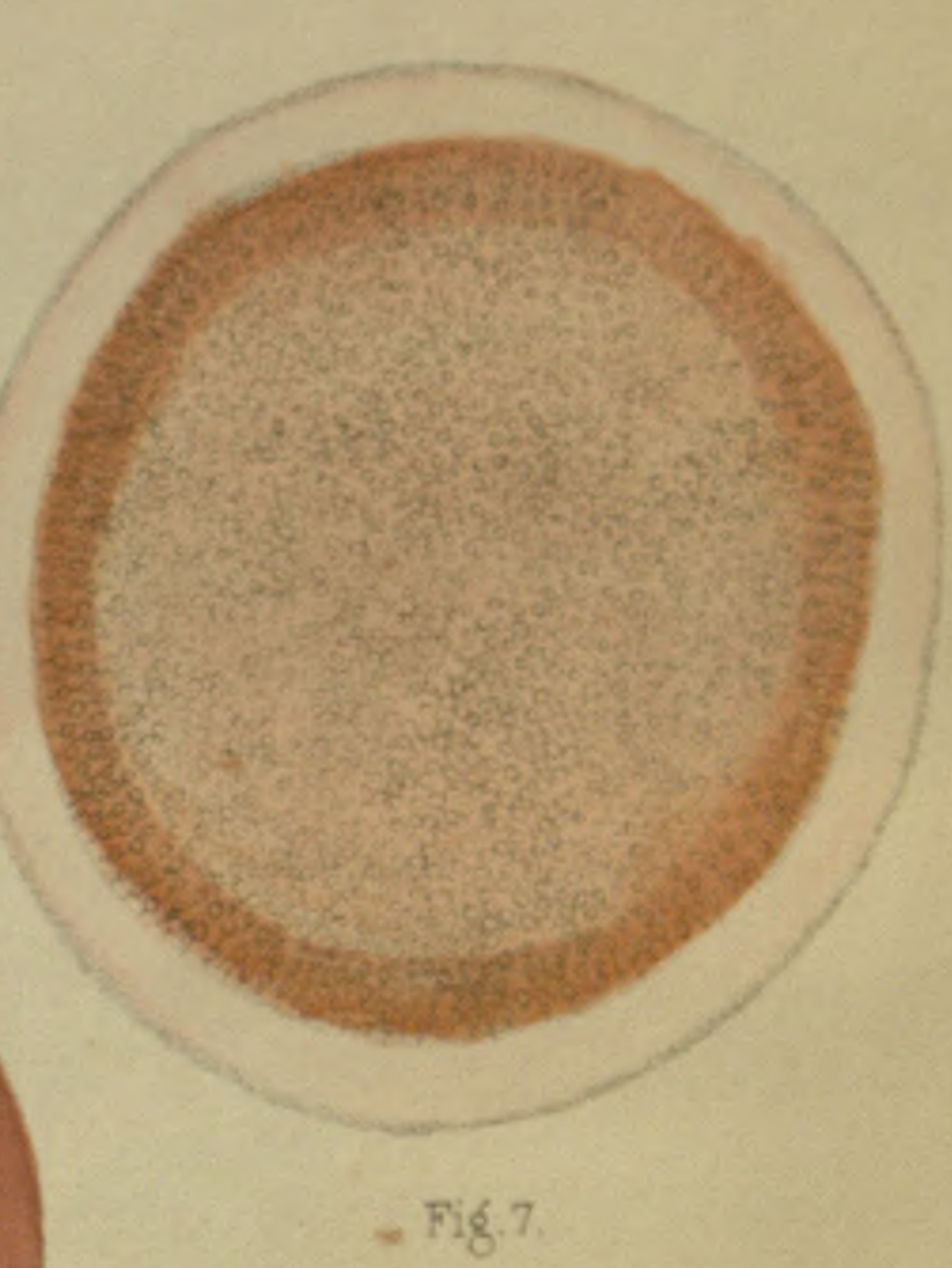

Fig. 7.

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Lith. by K. D. Chandra, Govt. School of Art, Calcutta.

FEMALE RECEPTACLES AND FLOWERS AT DIFFERENT STAGES OF DEVELOPMENT.

PLATE IV.

Fig. 1.

Fig. 2 × 25.

Fig. 3 × 25.

Fig. 4.

Fig. 5 × 119.

Fig. 6 × 690.

Fig. 7 × 690.

Fig. 8.

Fig. 9 × 850.

Fig. 10 × 850.

Fig. 11 × 690.

Fig. 12 × 500.

Fig. 13 × 690.

Fig. 14 × 42.

Fig. 15 × 119.

Fig. 16 × 119.

Fig. 17 × 370.

Fig. 18 × 370.

Fig. 19 × 119.

Fig. 20 × 370.

Fig. 21.

Fig. 22.

Fig. 23.

Fig. 24.

Fig. 25 × 370.

Fig. 26.

Fig. 27.

D. D. C. del. ad nat.

Lith. by H. L. Pal, Govt. School of Art Calcutta.

DETAILS OF STRUCTURE OF MALE AND GALL-FLOWERS BEFORE AND AFTER ACCESS OF INSECTS TO THE RECEPTACLES.

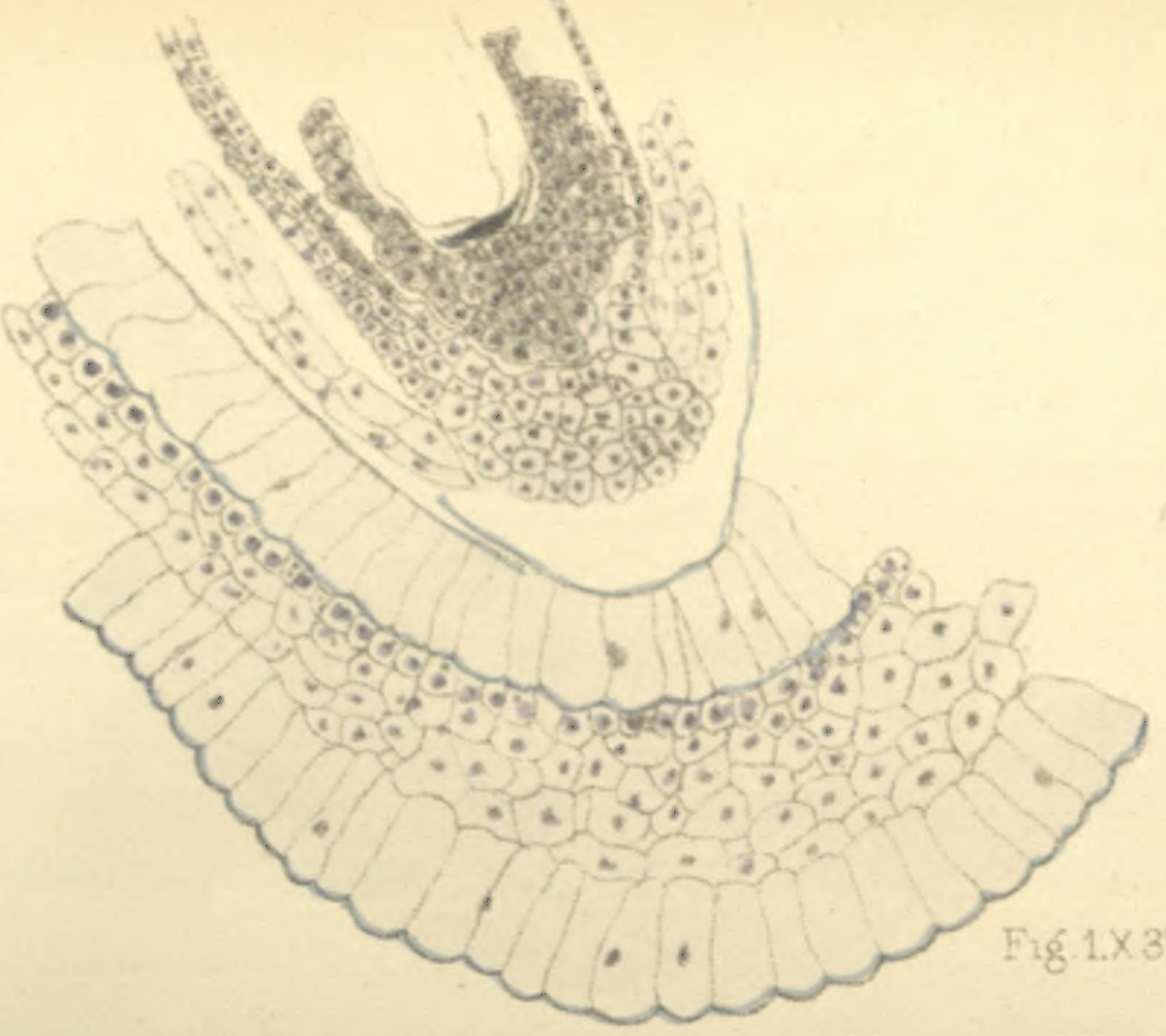
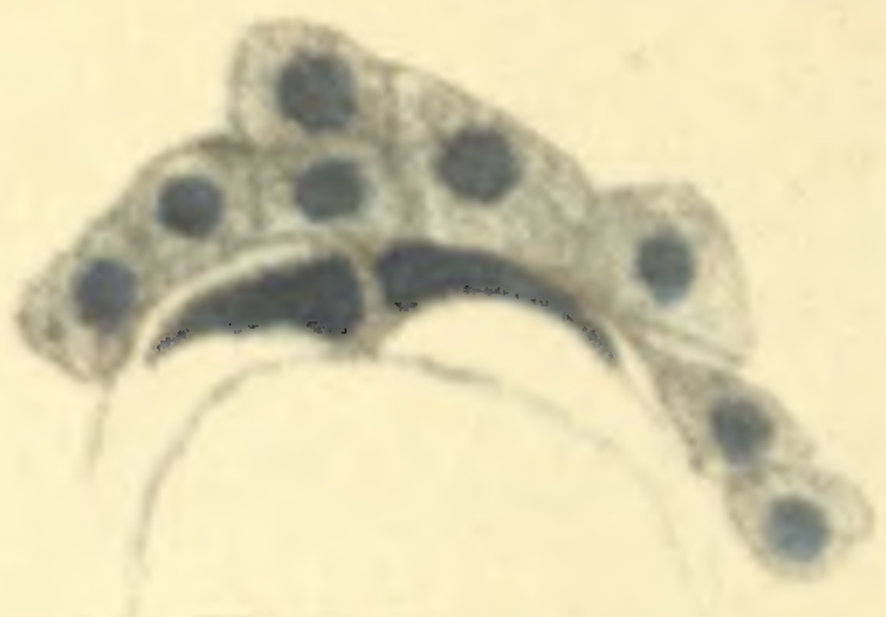


Fig. 1. X 370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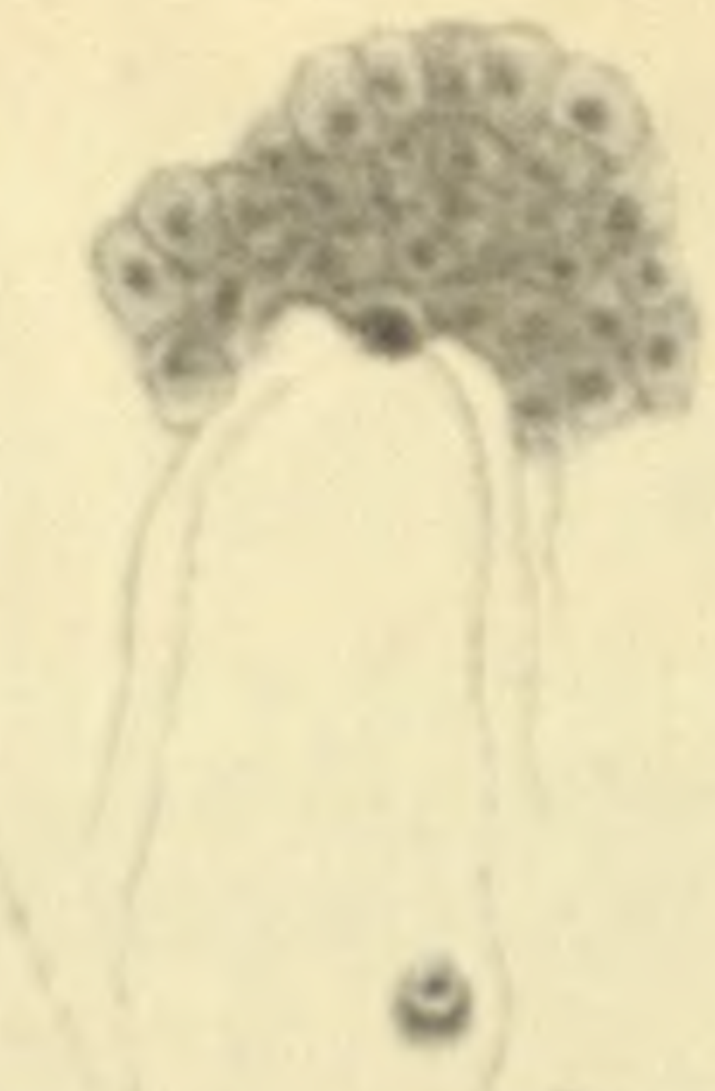
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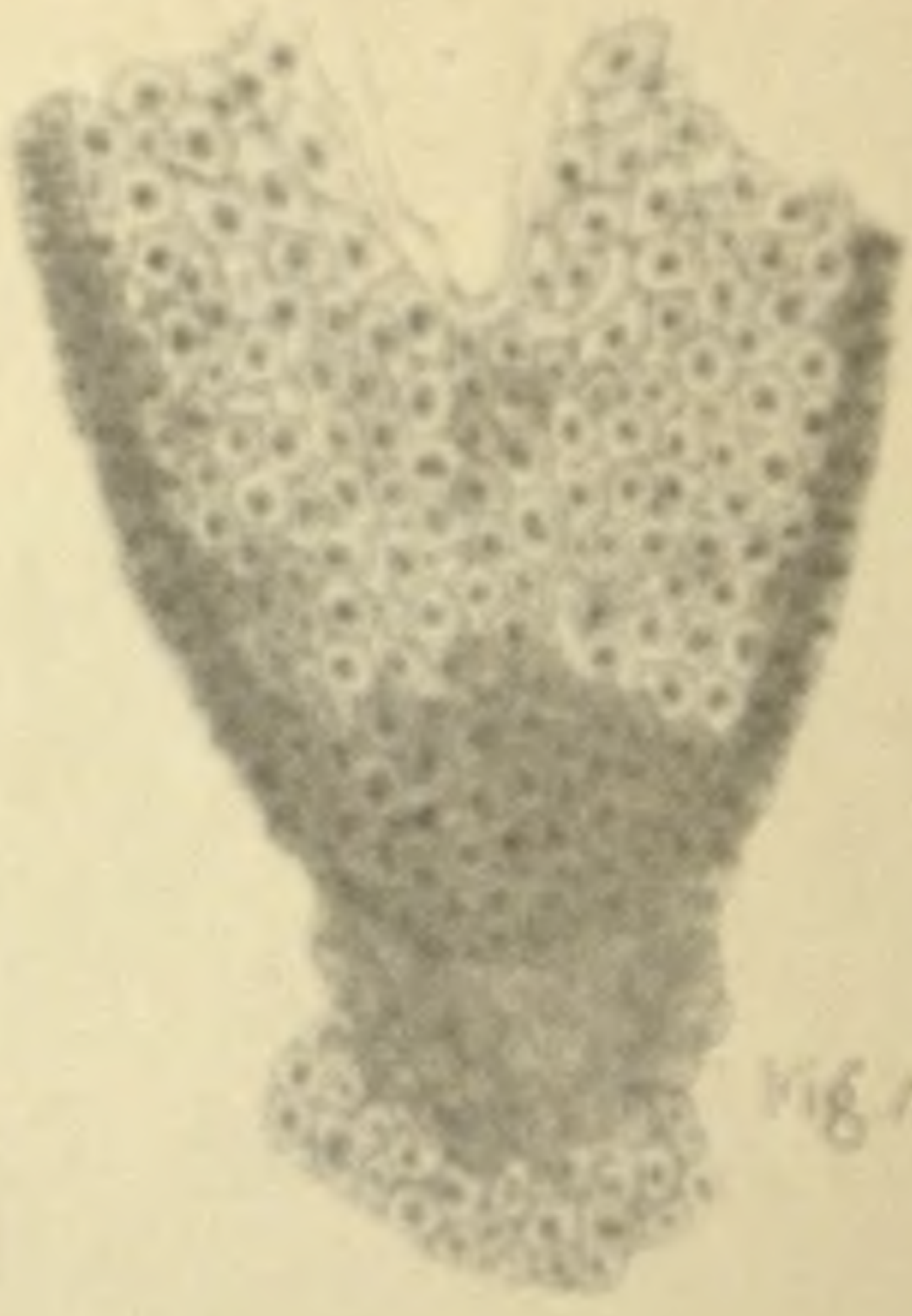
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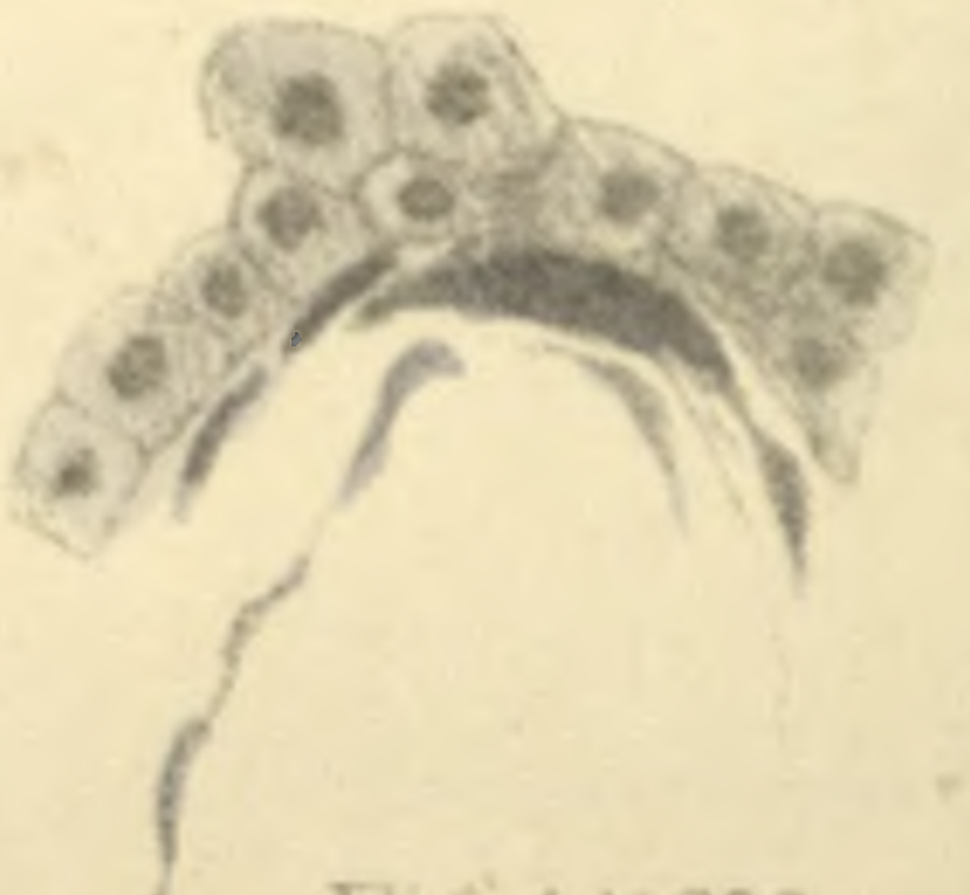
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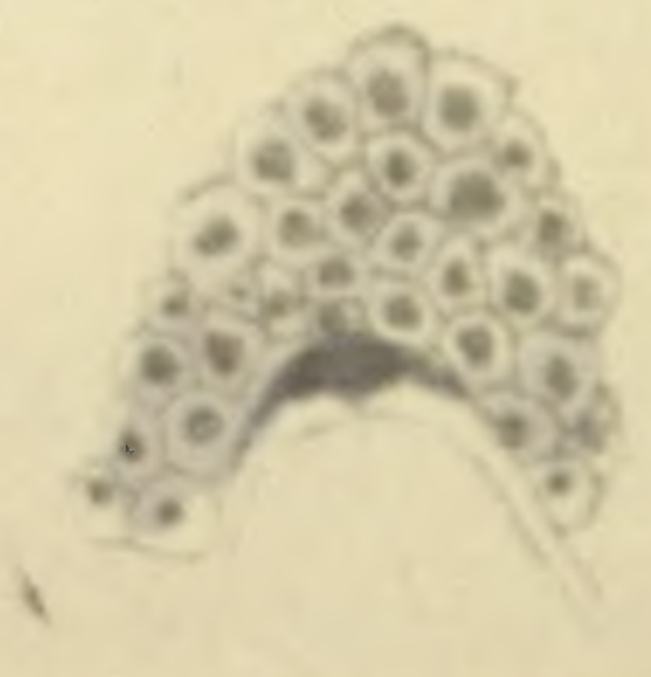
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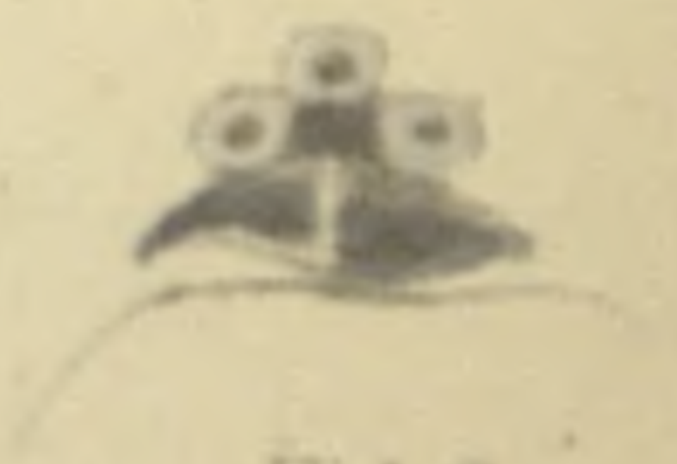
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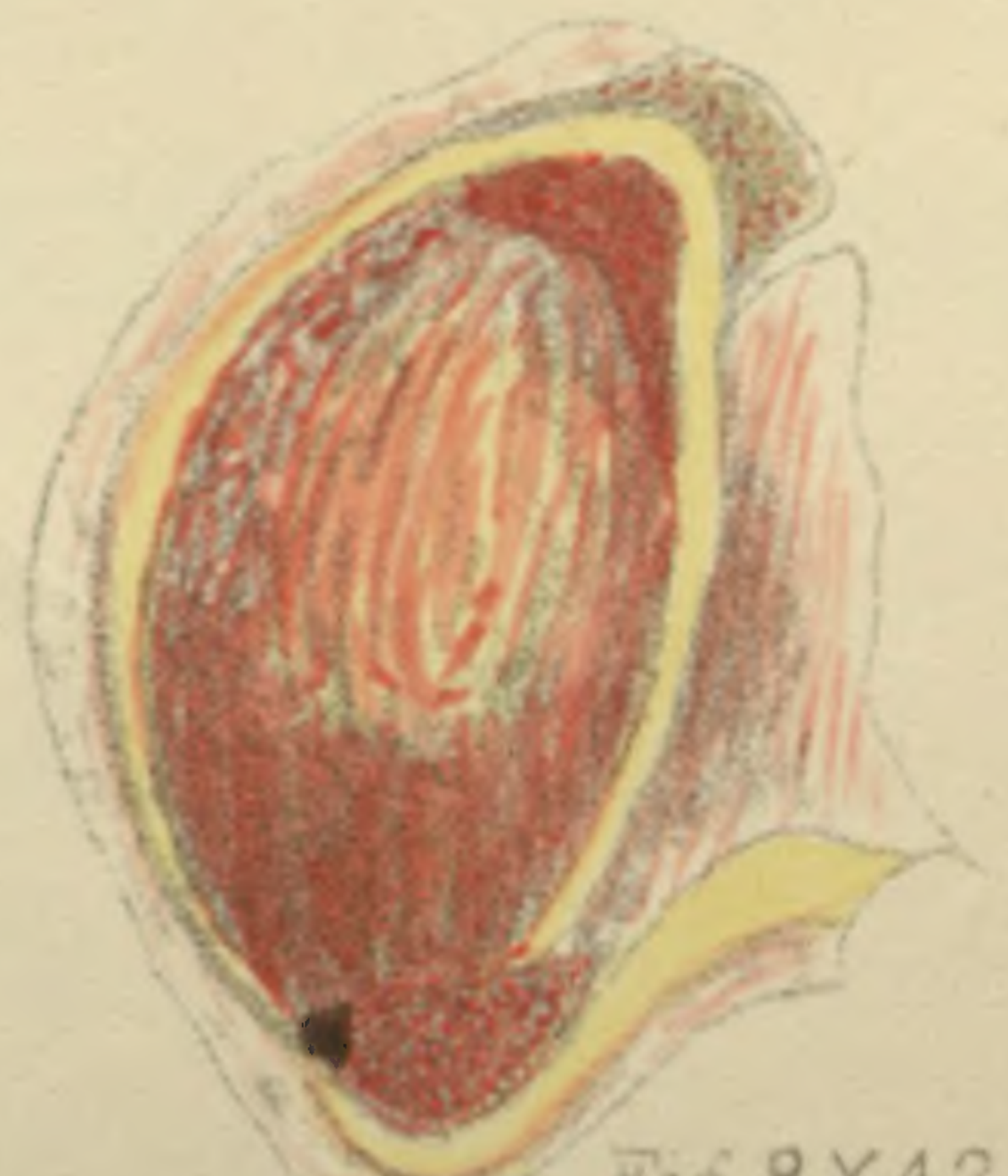
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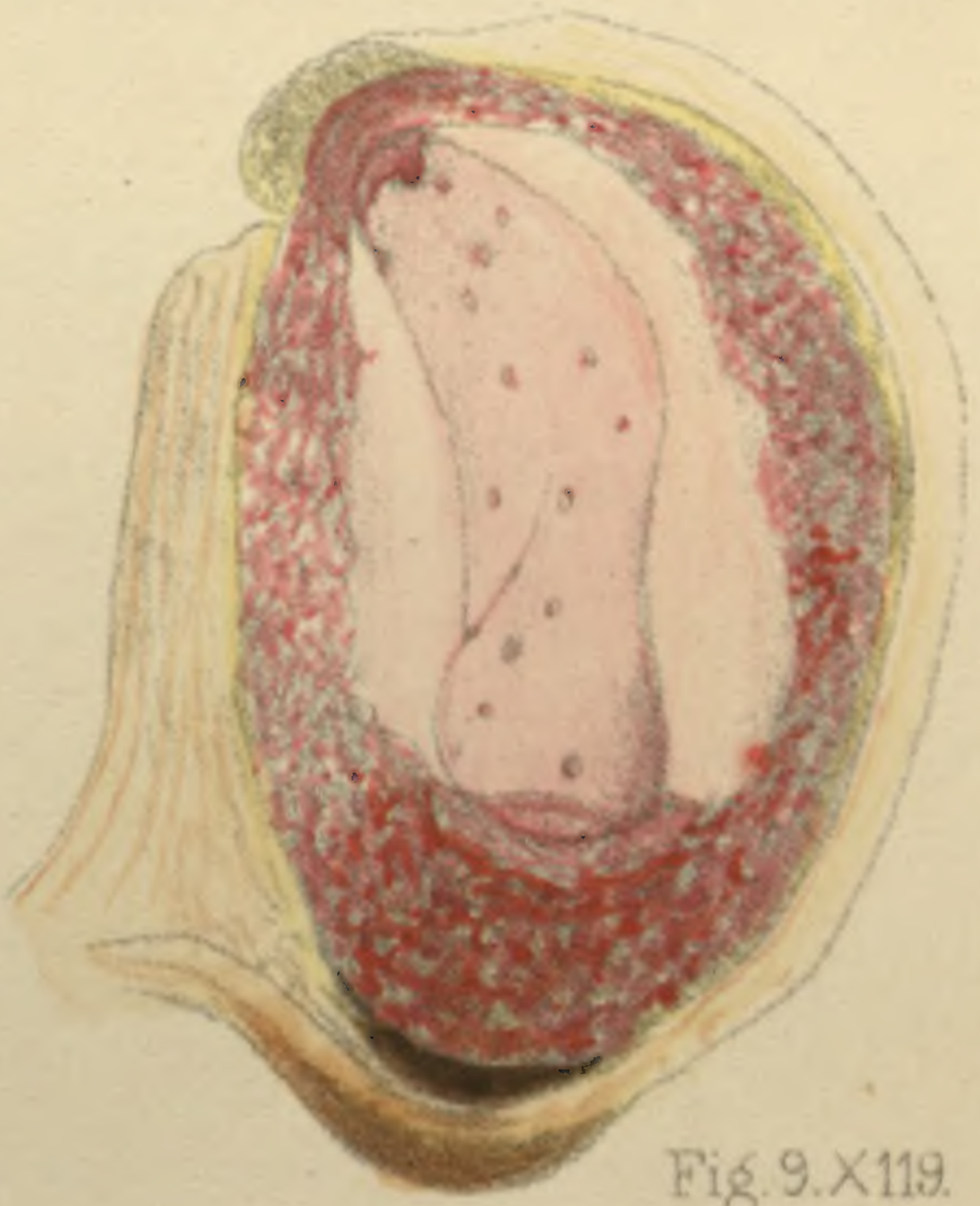
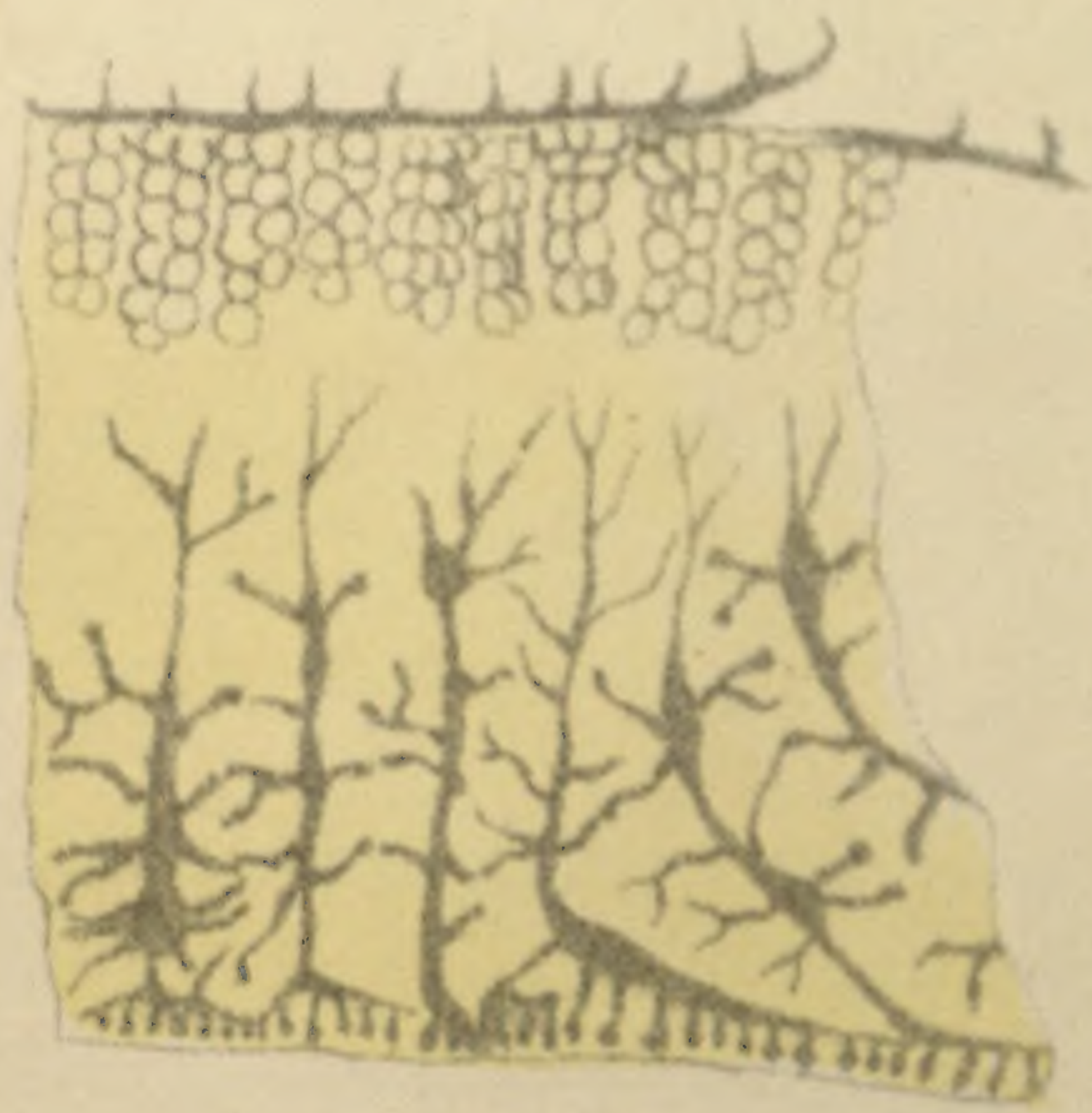


Fig. 9. X 119.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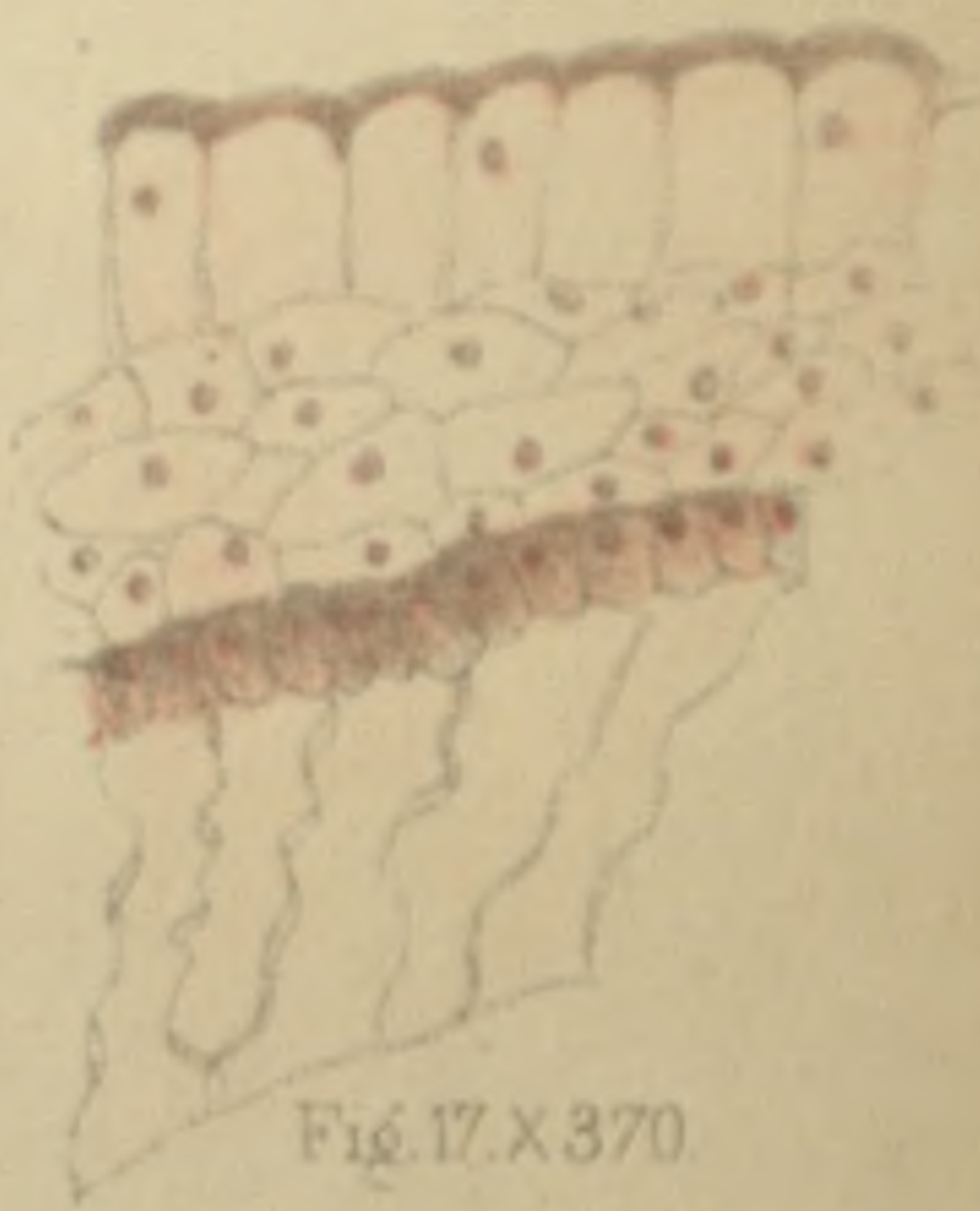
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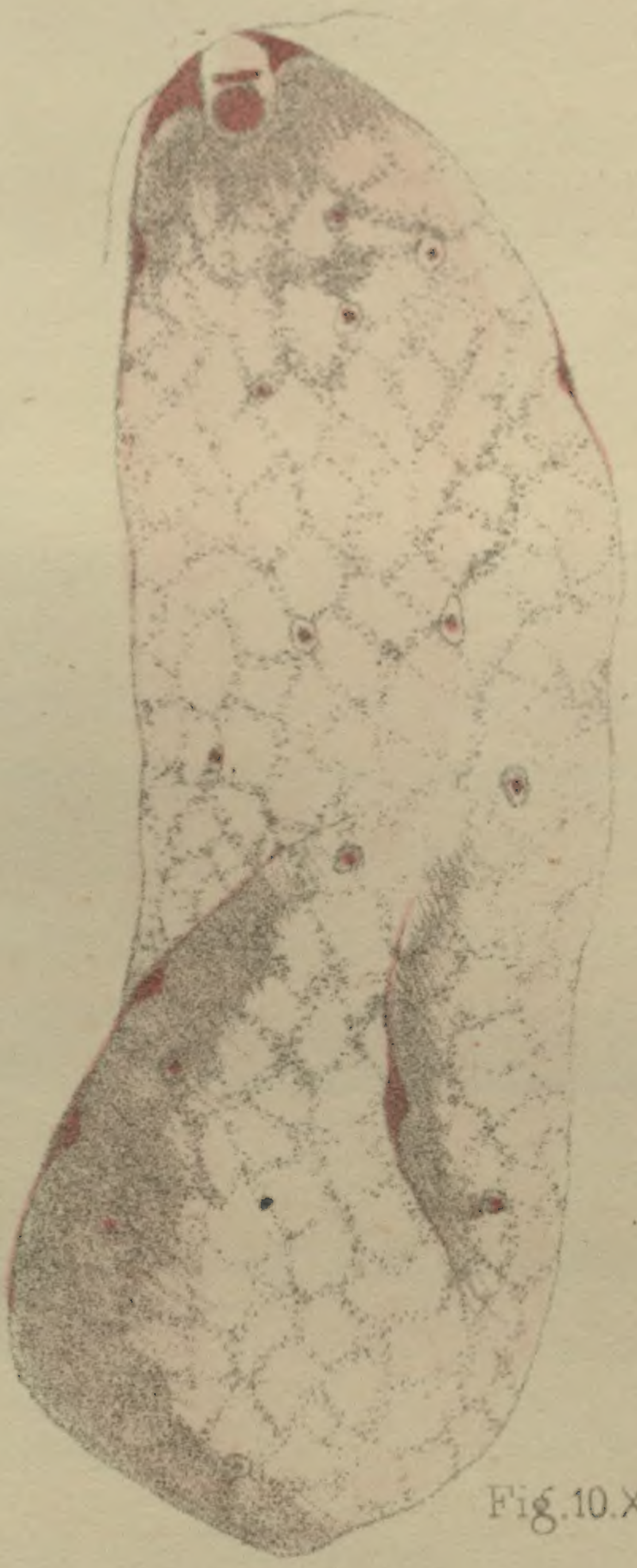
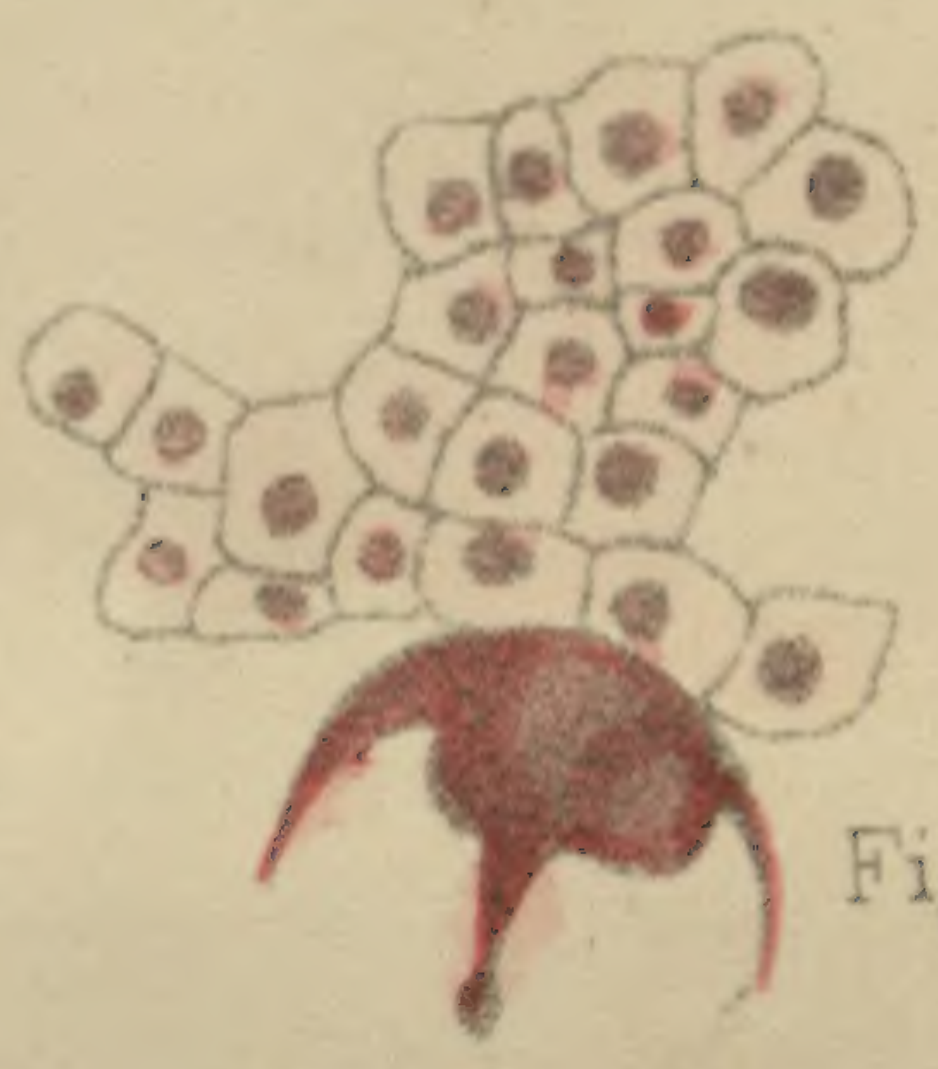


Fig. 10. X 370.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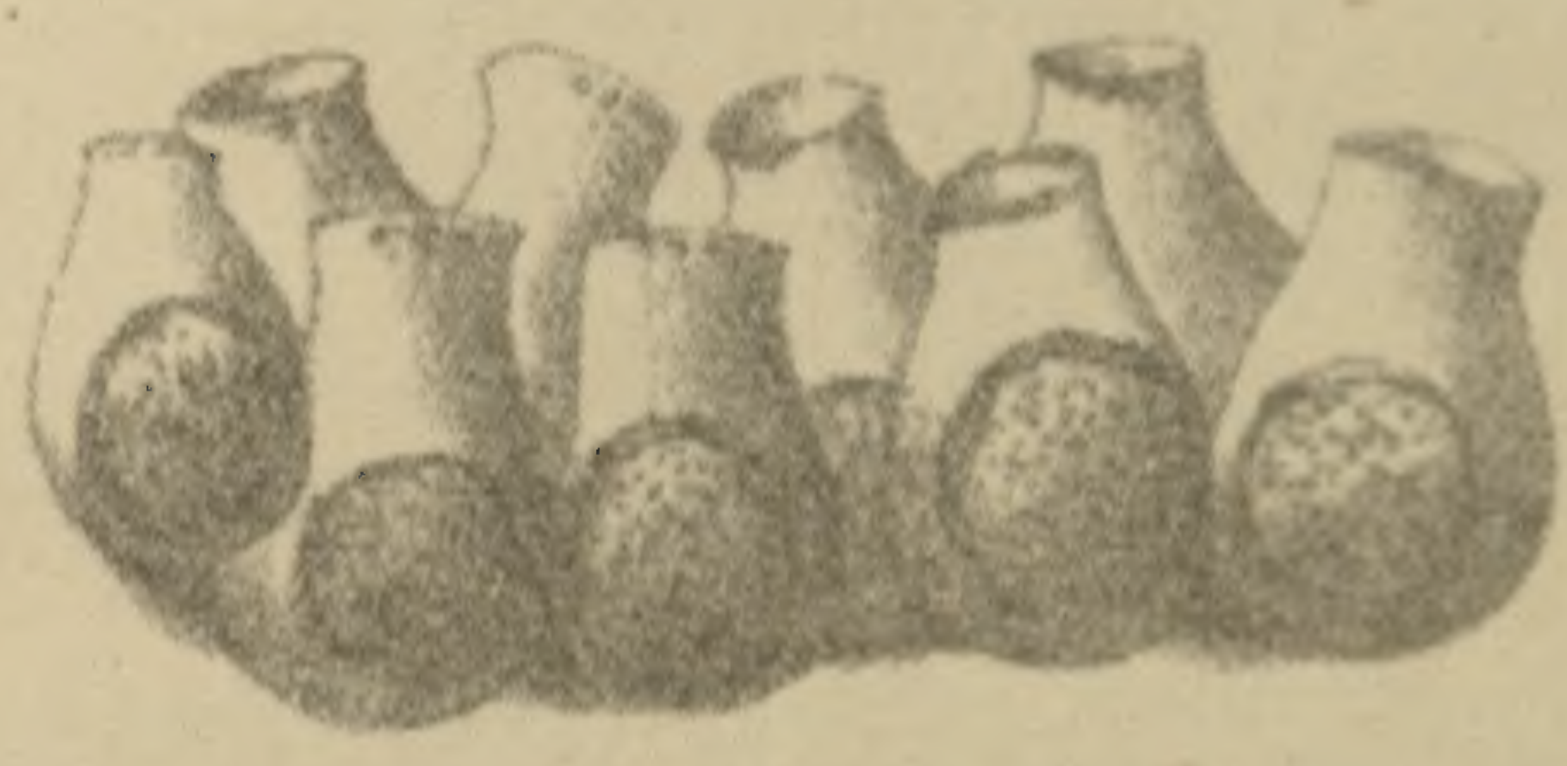
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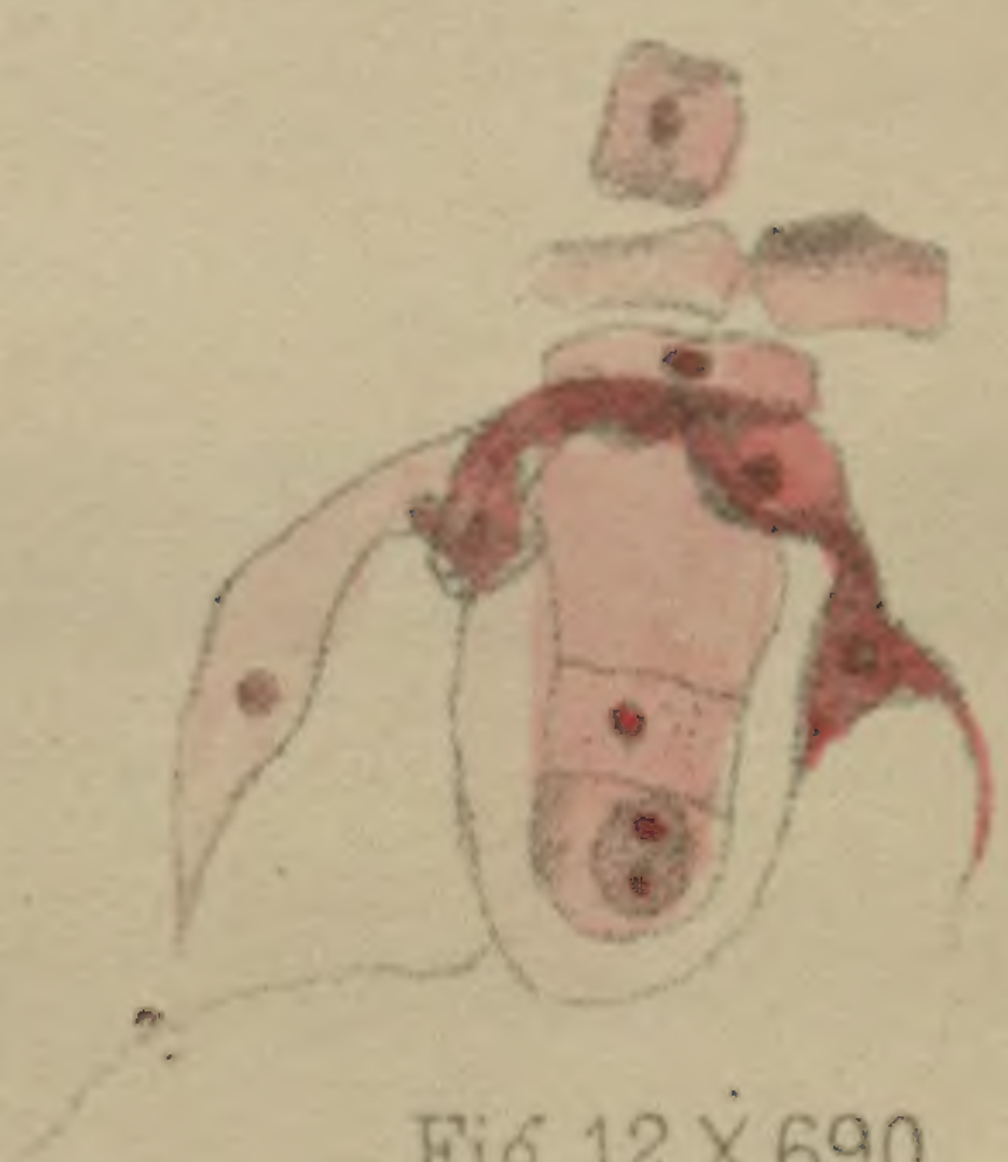
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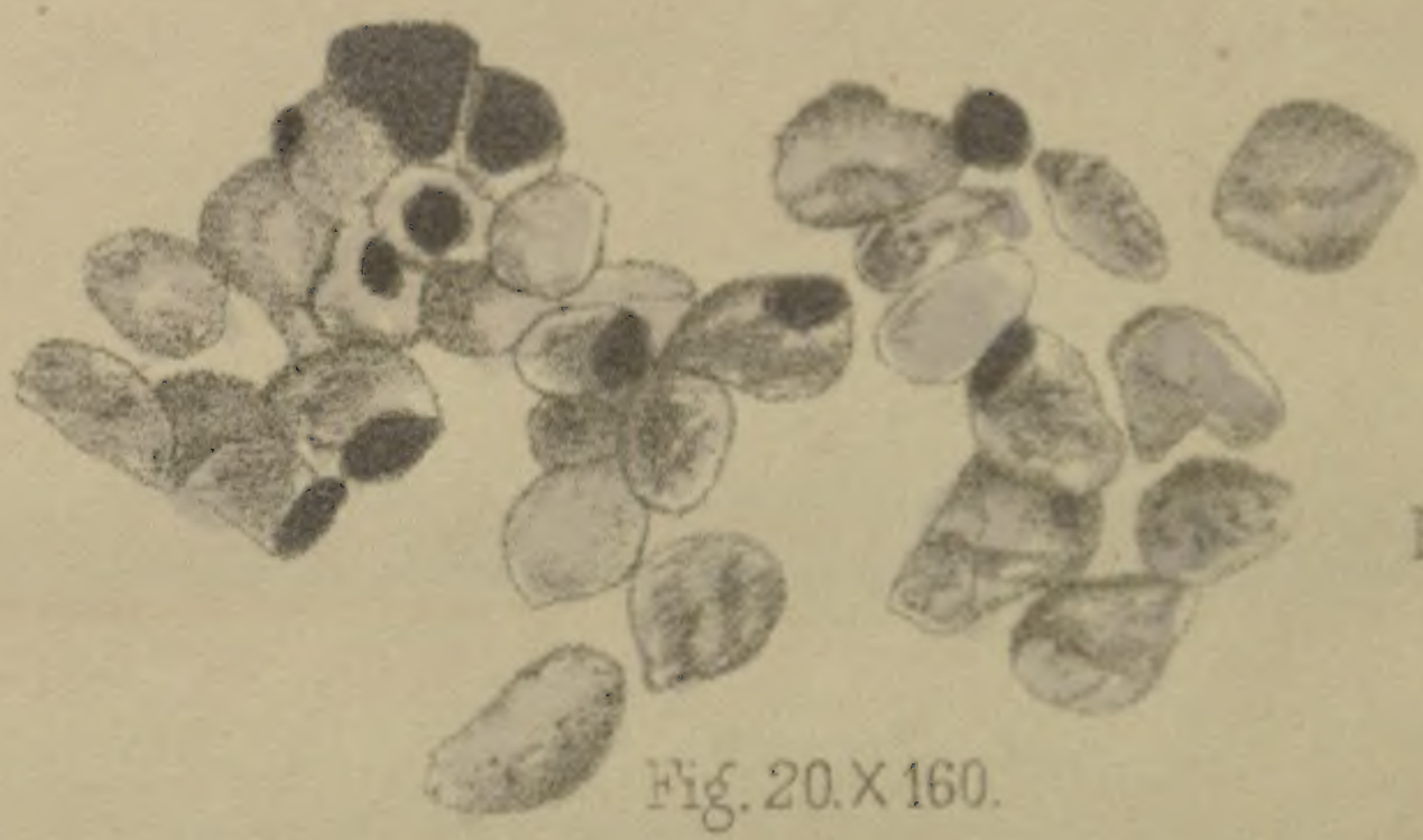
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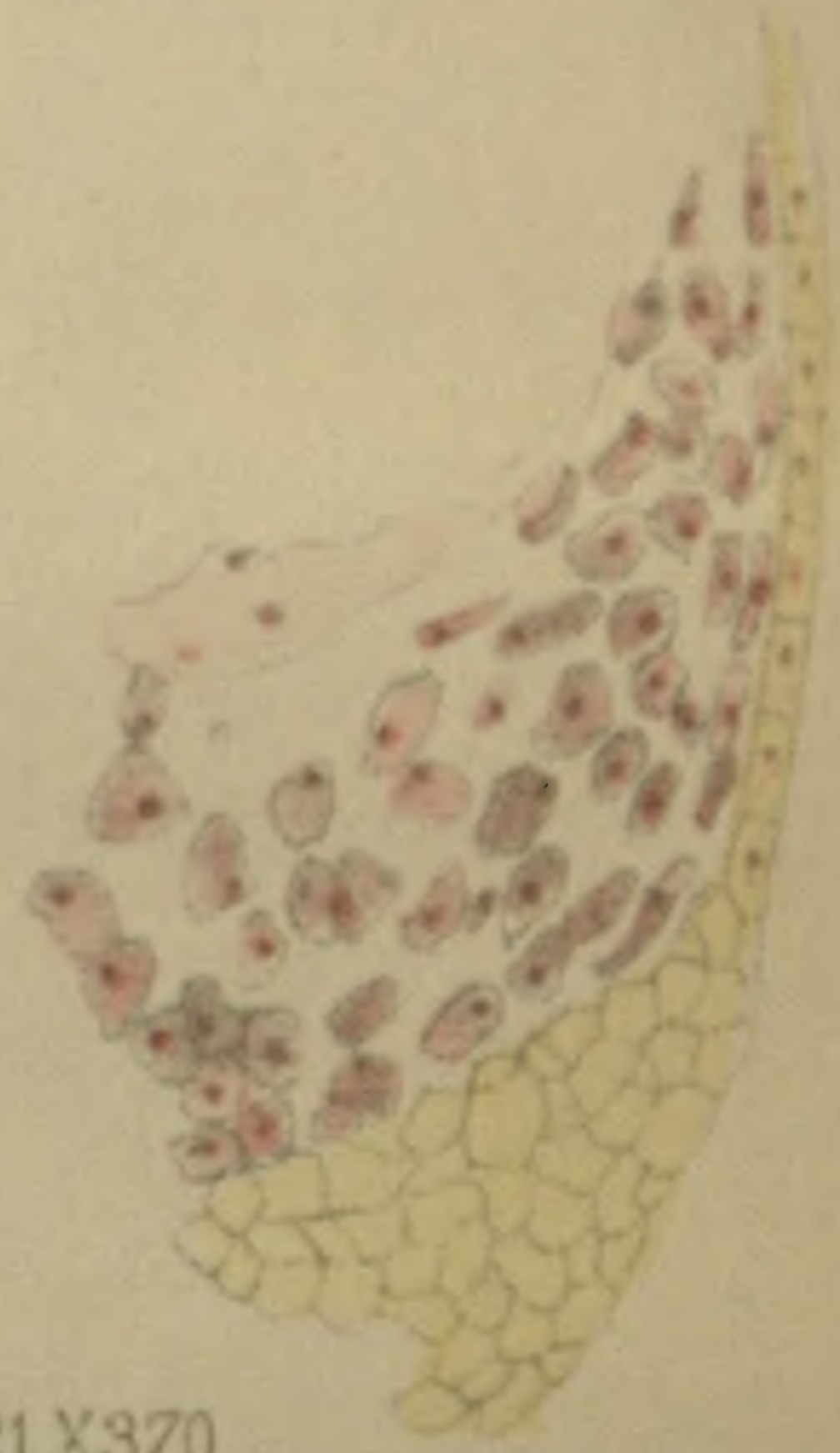
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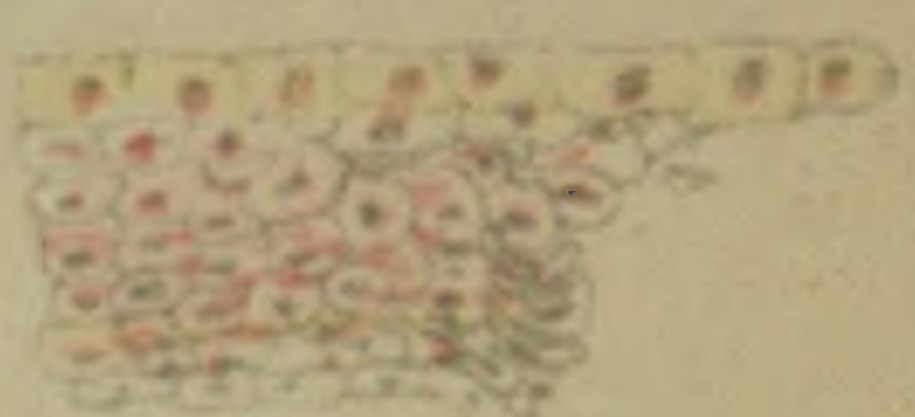
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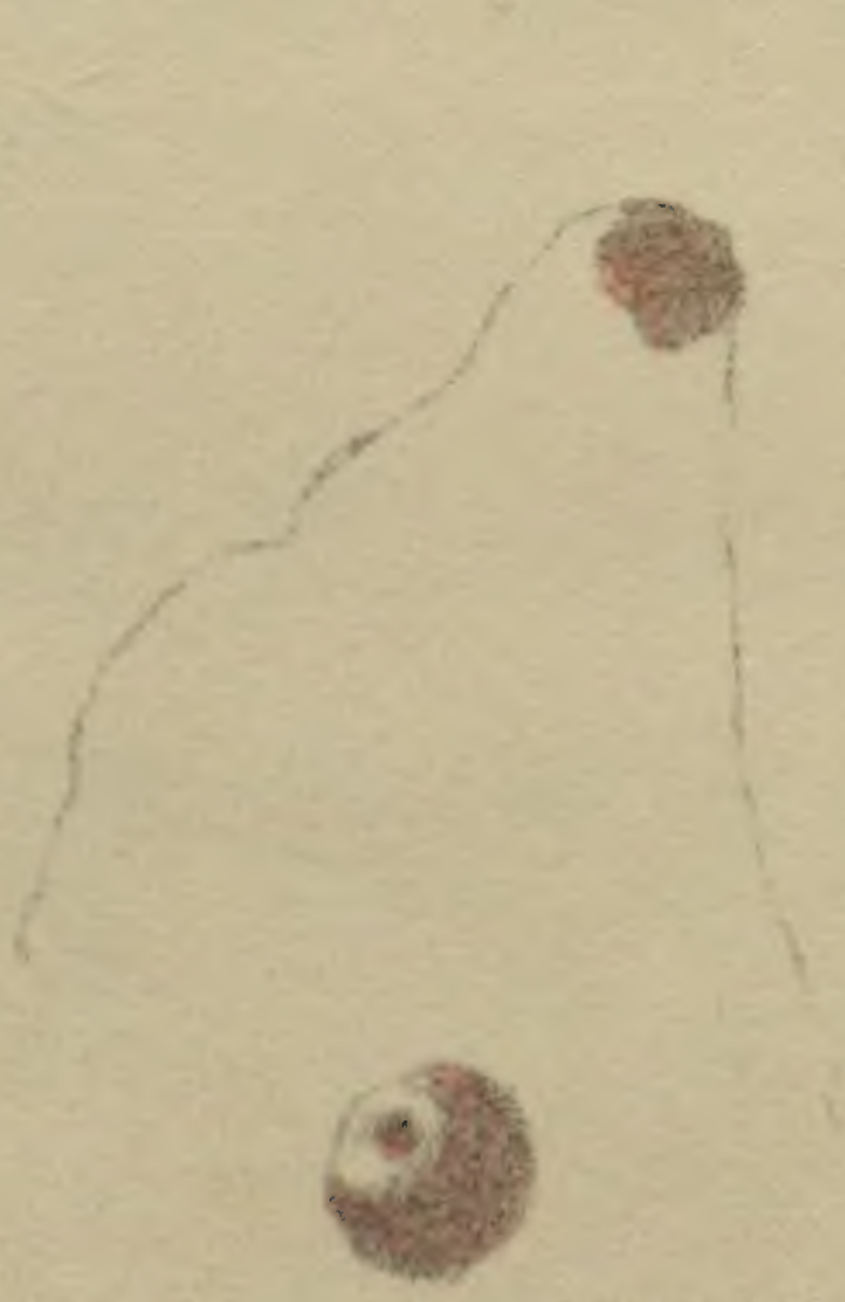
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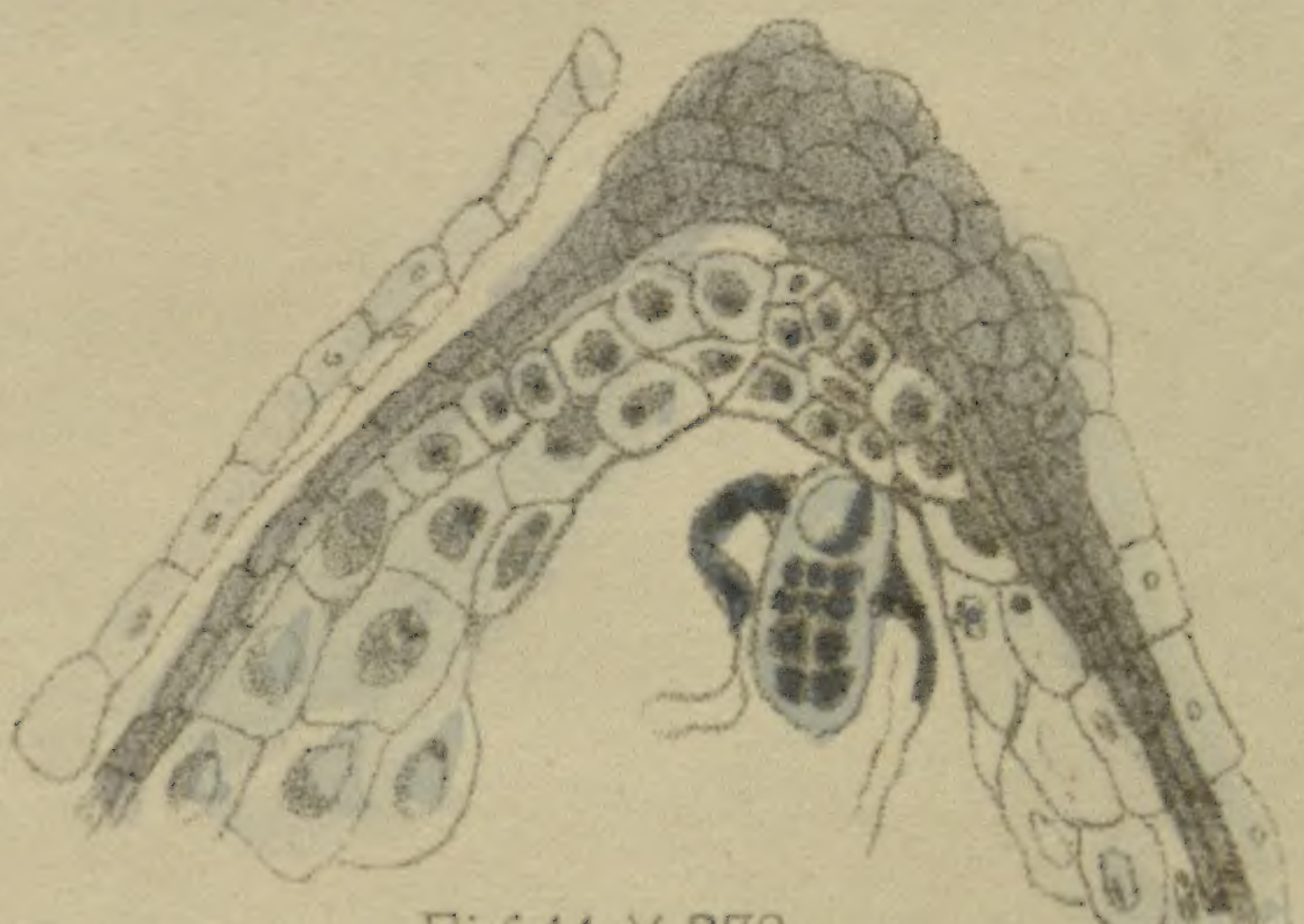
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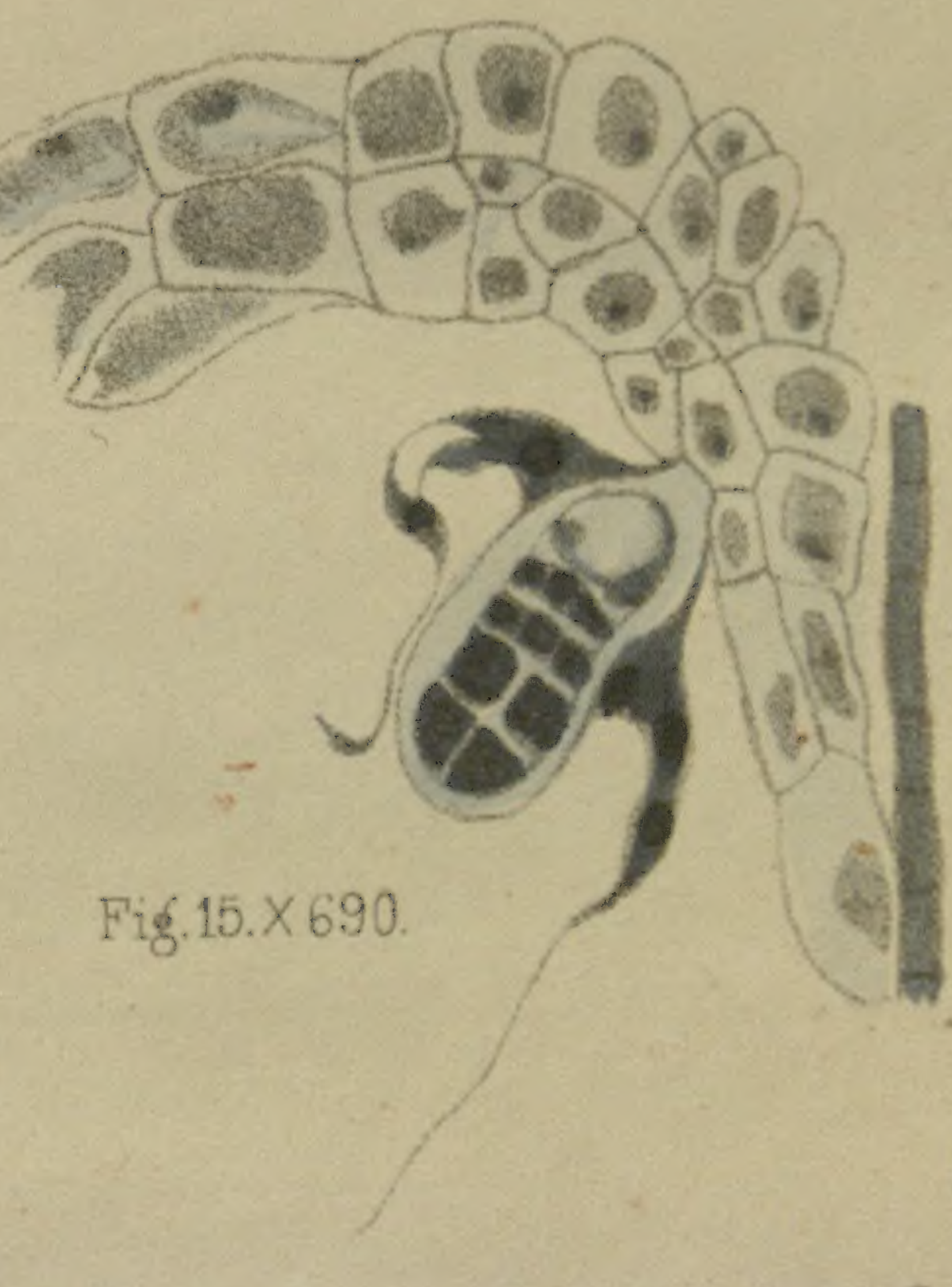
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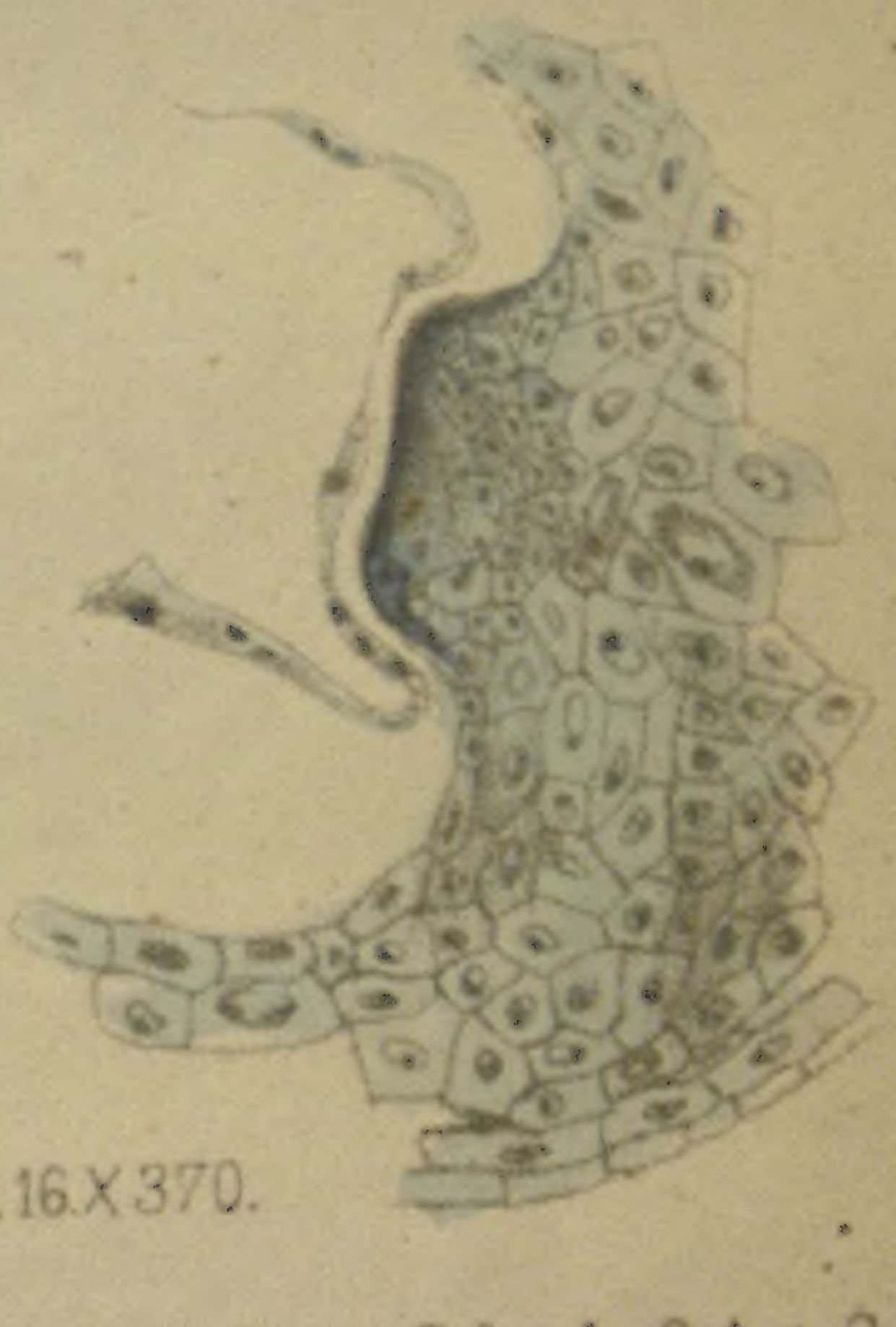
Fig. 16 X 370.

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Lith: by A. C. Chowdhory, Govt. School of Art Calcutta.

DETAILS OF STRUCTURE OF OVARIES AND OVULES BEFORE AND AFTER ACCESS OF INSECTS TO THE RECEPTACLES.